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3

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KEY TO PRONUNCIATION.

ā	far, father	ñ	Span. ñ, as in <i>cañon</i> (căn'yôn), <i>piñon</i> (pēn'yôn)
â	fate, hate	ng	mingie, singing
a or ă	at, fat	nk	bank, ink
ã	air, care	ō	no, open
ạ	ado, sofa	o or ố	not, on
â	all, fall	ô	corn, nor
ch	choose, church	ó	atom, symbol
ē	eel, we	ọ	book, look
e or ě	bed, end	oi	oil, soil; also Ger. <i>eu</i> , as in <i>beutel</i>
è	her, over: also Fr. <i>e</i> , as in <i>de; eu</i> , as in <i>neuf</i> ; and <i>oeu</i> , as in <i>boeuf</i> , <i>cœur</i> ; Ger. <i>ö</i> (or <i>oe</i>), as in <i>ökonomie</i> .	ō or oo	fool, rule
ẹ	befall, elope	ou or ow	allow, bowsprit
ě	agent, trident	s	satisfy, sauce
ff	off, trough	sh	show, sure
g	gas, get	th	thick, thin
gw	anguish, guava	th	father, thither
h	hat, hot	ñ	mute, use
h or н	Ger. <i>ch</i> , as in <i>nicht, wacht</i>	u or ũ	but, us
hw	what	ú	pull, put
i	file, ice	ü	between u and e, as in Fr. <i>sur</i> , Ger. <i>Müller</i>
i or ĭ	him, it	v	of, very
ı	between e and i, mostly in Oriental final syllables, as, Ferid-ud-din	y	(consonantal) yes, young
j	gem, genius	z	pleasant, rose
kw	quaint, quite	zh	azure, pleasure
ñ	Fr. nasal <i>m</i> or <i>n</i> , as in <i>embonpoint, Jean, temps</i>	' (prime), " (secondary)	accents, to indicate syllabic stress

THE AMERICANA

Behrens, bā'rēns, Bertha, popular German novelist, who has written over the signature, W. HEIMBURG: b. Thale, 1850. She completed 'Das Eulenhäus,' a posthumous novel by E. Marlitt, whose successor as contributor to *Die Gartenlaube* she became, and among her own novels may be named 'Aus dem Leben meiner Alten Freunden' (1878, 8th ed. 1890); 'Lumpenmüllers Lieschen' (1879); 'Ihr einziger Bruder' (1882); 'Waldblumen' (1882); 'Dazumel' (1887); 'Trudchens Heirat' (1884); 'Umfreund Schuld' (1895); 'Antons Erben' (1898).

Behring, bā'rīng, Emil Adolf, German physician: b. Hansdorf, 1854, and since 1895 director of the Hygienic Institute in Marburg. He has published 'Die Blutserumtherapie' (1892); 'Bekämpfung der Infektionskrankheiten' (1894) and in 1901 received the Nobel prize in medicine for his discovery of diphtheria serum.

Behring, bā'rīng or be'rīng. See **BERING**.

Beige, a light woolen fabric, made of wool of the natural color; that is, neither dyed nor bleached.

Beijerland, bī'er-lant, a fertile island in the Netherland province of South Holland at the mouth of the Maase. It produces great quantities of flax. Pop. 13,300.

Beilan, bā-lān', a town and pass in the north of Syria, on the Gulf of Iskanderoun. The pass has more than once been of military importance, and was in 1832 the scene of a battle between Turks and Egyptians. The town, 1,584 feet above the Mediterranean, has 5,000 inhabitants.

Beilstein, bīl'stīn, Freidrich Konrad, Russian chemist: b. St. Petersburg, 1838. In 1866 he became professor of chemistry in St. Petersburg Institute of Technology. He has published 'Anleitung zur qualitativen Chemische Analyse,' which has been widely circulated (1867); 'Die Chemische Grossindustrie auf der Weltausstellung in Wien' (1873); and a celebrated 'Handbuch der Organischen Chemie' (1800-1901).

Beira, bā'ra, a province of Portugal, bounded chiefly by the River Douro on the north, by Spain on the east, and by the Tagus and Portuguese Estremadura on the south, and by the Atlantic on the west. It was formerly divided into Beira Alta (High Beira), and Beira Baixa (Low Beira). Its extent is 9,248 square miles, and the pop. 1,518,406. The capital is Coimbra. It is traversed by the Serra d'Estrella, and well watered by the Douro, Tagus, etc. Though not fertile in grain, the produce of wine and olives is considerable. The heir-apparent of the Portuguese crown is styled Prince of Beira. For purposes of administration the province is subdivided into the districts of Aveiro, Visien, Coimbra, Guarda, and Castello Branco.

Beira, a seaport on the coast of Portuguese East Africa, at the mouth of the Pungwe River, a little to the north of Sofala. It is the

nearest port to the gold fields of Mashonaland, and a railway through Fontesvilla, Chimoio, Massikessa, and New Umtali to Salisbury was completed in 1899. Beira has a good harbor, and a breakwater guards the town from the encroachments of the river. Beira is visited regularly by British India Steam Navigation, German East Africa, and Austrian Lloyd vessels. Exports (1909) \$1,500,000—sugar, rubber, beeswax, ivory, hides and horned heads; imports (1909) \$1,600,000, of which \$1,188,750 passed through Beira to the British sphere. Pop. 3,379, 1,438 whites.

Beiram, bā'rām. See **BAIRAM**.

Beirut, or Beyrout, bē-rut, or bā-root', (ancient BERYTUS), a flourishing seaport of Syria, 60 miles northwest of Damascus. It stands on a tongue of land projecting into an open bay, and spreading out toward the land into a beautiful plain, backed by the mountains of Lebanon. It consists of the old town, composed generally of narrow dirty streets, the residence of the poorer classes, and the business place of the merchants; and of the new town, which stretches around it. The latter, with its modern houses, carriage roads, and gardens,—its churches, colleges, schools, and hotels,—has little or nothing of the Oriental in its composition. Beirut has rapidly increased since 1844 when its population was only 8,000, its rise being largely due to the extension of the silk trade, of which it is the centre. The better protection afforded both to foreigners and natives by its being the residence of the consuls-general has also contributed to its prosperity. It is the seat of a consulate of the United States. Besides silk its principal exports are olive oil, cereals, sesame seed, tobacco, and wool. Ship-building is carried on here; an English company completed waterworks here in 1875 and gas works were built by a French company in 1886. Besides a Scottish school for Jews, there is an American-Syrian mission in Beirut, printing annually thousands of Arabic Bibles and having a school and hospital connected with it. In ancient times Beirut was a large and important Phœnician city, and under the Romans was long celebrated for its school of jurisprudence. The Byzantine Emperor Theodosius II. raised it to the rank of a metropolis. After being destroyed by an earthquake in 551, it again rose to a considerable town in the time of the Crusades. In later times it was long in the possession of the Druses. It was bombarded and taken by the British on 29 Aug. 1840. There is a railway to Damascus. Pop. 120,000.

Beisa, bī'sa, a large Abyssinian antelope (*Oryx beisa*), differing from the gemsbok principally in lacking the tuft of hair on the throat and by the black patch on the front of the face being completely separated from the cheek stripe. This is probably the animal called oryx by the ancients, and may be the animal from which is derived the legend of the unicorn. Its straight horns (about 36 inches long) when seen in profile might easily appear as one. Herds of beisas are still numerous upon the plains of Somaliland. See also **GEMSBOK**; **ORYX**.

Beissel, bi'sël, **Johann Conrad**, German mystic: b. Eberbach, 1690; d. Ephrata, Pa., 1768. He studied theology at Halle, but having been banished in 1720 for his Pietistic opinions he emigrated to Pennsylvania, settling first at Germantown and later in Lancaster County. In 1724 he returned to Germantown and adopted the Dunker faith, but his views as to celibacy and his observance of Saturday as the Sabbath were unacceptable to his neighbors, and he therefore established a sect of Seventh Day Dunkers. He attempted a hermit life, but his fellow believers gathered about him and in 1735 he founded the famous Settlement of Ephrata, Pa. (q.v.), and remained at its head till his death. He was the author of the earliest volume of German poetry published in America, 'Gottliche Liebes und Lobestöne' (1730), and published several collections of hymns, such as 'The Voice of the Lonely and Forsaken Turtle Dove—that is, of the Christian Church; by a Peaceable Pilgrim traveling to Tranquil Eternity' (1747); and 'Paradisical Wonder-Play' (1766). In the latter are found the 'Brother Song' of the sect with its 215 stanzas, and the 'Sister Song' with 250. He was known at Ephrata as Friedsam, and on his tomb may be read the inscription: "Here rests an outgrowth of the love of God, 'Friedsam,' a solitary Brother, afterward a leader, ruler, teacher of the Solitary and the Congregation of Christ in and around Ephrata." See 'Chronicon Ephrateuse' (1786); Sachse, 'German Sectarials of Pennsylvania' (1899-1900).

Beit, Alfred, German colonial financier: b. Hamburg, Germany, 1853; d. London, England, 16 July 1906. He was educated in the schools of his native city, emigrated to South Africa in 1873, and was a diamond merchant in Kimberley 1875-88. He became partner in the banking firm of Werner, Beit & Co. in 1888. On the discovery of gold in the Transvaal he purchased mining lands on an extensive scale, and prior to the Boer war in 1899 was chief partner in mines producing annually \$90,000,000 of gold. He was a director of the Rand and Bultfontein mines, of the Rhodesia railways, of the Bechuana Railway Trust, and the Transvaal Consolidated Lands Company. His business offices were in Bishopsgate Street, London, and his wealth was estimated at over \$100,000,000.

Beit-el-Fakih, bāt-ēl-fā'ke, a town of Arabia, in Yemen, 32 miles south-southeast of Hodeidah, and 77 northeast of Mocha. It is celebrated for its trade in Mocha coffee, which is chiefly grown in the neighborhood. Pop. about 8,000. The word *Beit*, signifying a house or hut, is prefixed to the name of various other small towns and villages in Arabia.

Beitullah, bāt-ūl'la, the name of the building in Mecca within whose enclosure the Caaba (q.v.) is located.

Beitzke, bits'kē, **Heinrich Ludwig**, German historian: b. Muttrin, 15 Feb. 1798; d. 10 May 1867. His publications include 'History of the German War for Freedom' (1855); 'History of the Russian War—Year of 1812' (1856); 'History of the Year 1815' (1865), etc.

Beja, bā'zha (anciently PAX JULIA), a town of Portugal, in the province of Alemtejo, 85 miles southeast of Lisbon. It stands on a height, surrounded by walls flanked with 40 towers, and

is defended by an old fort. It was founded by the Romans, and some Roman remains are still visible. The town has two annual fairs and has an extensive trade in cattle and agricultural products.

Bejapur, bē-ja-pōr' (anciently VIJAYAPURA, the impregnable city), a town of Hindustan in the Bombay presidency, near the borders of the Nizam's dominions, about 245 miles southeast of Bombay, and near the right bank of an affluent of the Krishna. From the great extent of the ruins here it would seem to have been formerly one of the largest cities of India. In its present state it may be described as two towns adjoining each other—the fort on the east, and the old town on the west. The former, though much less than the latter, has one entire and regular street 50 feet wide and nearly 3 miles long. Some of the mosques and mausoleums of Bejapur are elaborately elegant, but the prevailing character is solid and massive. The great dome of Mahomet Shah's tomb is visible far off. The fretwork on the ceilings and verandahs, the panels covered with passages of the Koran in bas-relief, and the stone trellises pierced with a mesh-work of Arabic characters, are all in the richest style of Oriental sculpture. Among the religious structures is a Hindu temple, built in the earliest style of Brahmanical architecture. There are here some guns of enormous size; one cast in 1549 is the largest piece of brass ordnance extant. Bejapur has become the chief town of Kaladgi district, and some of the old palaces are now used for public purposes. Pop. about 17,000. See Ferguson, 'Ancient Architecture in Hindustan' (1847); Ferguson, 'The Study of Indian Architecture' (1867).

Bejar, bā'jār, a town of Spain, in the province of Salamanca, 41 miles south of the town of that name. It is surrounded by old walls, and has considerable manufactures of cloth. Lord Hill defeated a French force here in 1813. In its vicinity are warm sulphur springs.

Beke, Charles Tilstone, English traveler: b. Stepney, Middlesex, 10 Oct. 1800; d. Bromley, Kent, 31 July 1874. In his 20th year he entered on a business career, and was thus led to visit Italy. On his return he studied law at Lincoln's Inn, and in 1834 he followed up several archaeological articles in periodicals by publishing 'Origines Biblicæ, or Researches in Primeval History.' In 1837-8 he was British consul at Leipsic, and in 1840 set out on his first journey to Abyssinia. Returning in 1843 he was awarded the gold medals of the Royal Geographical societies of London and Paris, and again engaged in business. He subsequently made several efforts to open up commercial intercourse with Abyssinia, and in 1861-2 he traveled in Syria, Palestine, and Egypt. When the news of the detention of several British subjects by the king of Abyssinia arrived in 1864, Beke went out to secure their release, and was temporarily successful, but ultimately King Theodore had to be coerced by war. In the direction of the military operations Beke's knowledge of the country proved of the utmost value, and in 1870 he received a civil list pension of \$500 per annum. In 1873 he set out for Egypt in order to explore the country traversed by the Israelites, and to locate Mount Sinai. His published works com-

prise: 'The Sources of the Nile' (1860); 'The British Captives in Abyssinia' (1865); 'King Theodore and Mr. Rassam' (1869); 'The Idol in Horeb' (1871); 'Jesus the Messiah' (1872); 'Discoveries of Sinai in Arabia, and of Midian' (1878).

Bekes, bā'kāsh, a market town of Hungary, and capital of the county of the same name, at the junction of the Black and White Körös, 41 miles southwest of Grosswardein; formerly strongly fortified. Chief productions—flax, cattle, wheat, wine, and honey, in all of which the trade is considerable. Pop. about 25,000.

Bekker, bēk'kēr, Elizabeth, Dutch novelist: b. Vlissingen, 24 July 1738; d. The Hague, 5 Nov. 1804. She married Adriaan Wolff, a Reformed Church minister at Beemster, who died in 1777, and lived afterward in closest friendship with Agathe Deken, who also collaborated in her most important works, 'History of Sara Burgerhart' (1782); 'History of William Leevend' (1784-5); 'Letters of Abraham Blankaart' (1787-9); 'Cornelia Wildschut' (1793-6).

Bekker, Immanuel, German scholar, distinguished by his recensions of the texts of Greek classics: b. Berlin, 21 May 1785; d. there, 7 June 1871. He studied in Halle, and, in 1811, became professor of philology in his native city. The results of his researches in the libraries of France, Italy, England, and Germany, appear in his numerous recensions of texts derived solely from MSS., and independently of printed editions. The writers included in these recensions are Plato, the Attic orators, Aristotle, Thucydides, Theognis, Aristophanes, as well as Livy and Tacitus.

Bél, bāl, Karl Andreas, Hungarian historian, son of Matthias Bél (q.v.): b. Presburg, 1717; d. 1782. He was professor of poetry at Leipsic and was author of 'De Vera Origine et Epocha Hunnorum, Avarum Hungarorum in Pannonia' (1757); 'De Maria Hungariæ non Rege sed Regina' (1744).

Bél, Matthias, Hungarian historian: b. Orsova, 1684; d. 1749. He was distinguished as a theologian and historian, and became rector of the Protestant schools at Neusohl. He wrote on the history of Hungary alone, and achieved much distinction. His writings are even now much valued for reference purposes.

Bel, bēl, one of the most important gods of the Babylonian mythology; mentioned in Scripture, in Is. xlv. 1; Jer. i. 2; li. 44; in the Septuagint, in Baruch vi. 40, and in the apocryphal additions to the Book of Daniel, as well as by classical authors. Much light has recently been thrown on Bel's characteristics and position in the heavenly hierarchy, by the examination of the cuneiform tablets and sculptures. It has been ascertained that, prior to 1600 B.C., the highly interesting Turanian people called Accadians, the inventors of the cuneiform writing, who wielded extensive authority in western Asia before the Semitic Assyrians and Babylonians had come into notice, worshipped as their first triad of gods, Anu, ruling over the heaven; Elu, Belu, or Bel, over the earth; and Ea, over the sea. Bel's three children, or three of his children, were Shamas, the sun-god; Sin, the moon-god; and Ishtar, the Accadian Venus.

Sayce shows that some first-born children were vicariously offered in sacrifice by fire to the sun-god. From the Accadians the observance of human sacrifice passed to various Semitic tribes and nations. Bel's name Elu identifies him with the Phœnician El, who, in a time of trouble, offered his first-born son, "the beloved," on a high place, by fire. It is not settled whether or not Bel was the same also as the Phœnician Baal. To the wrath of Bel the deluge was attributed. In Scripture times he was known exclusively as a Babylonian divinity, being distinguished from both Nebo and Merodach. In the later Babylonian empire, however, Merodach came to be generally identified with Bel, though sometimes distinguished from him, being called "the lesser Bel."

Bel and the Dragon, certain apocryphal chapters added to the canonical Book of Daniel. The Jews do not consider them part of their Scriptures. They were penned probably by an Alexandrian Jew, the language used being not Hebrew, nor Aramaean, but Greek. The story of Bel and the Dragon tells how Daniel enlightened Cyrus, represented as having been a devout worshipper of Bel, by proving that the immense supplies of food laid before the idol were really consumed, not by it or by the inhabiting divinity, but by the priests and their families. On Cyrus urging that the dragon, also worshipped, was at least a living God, Daniel poisoned it, for which he was thrown into a lion's den, where the Prophet Habakkuk fed him. Ultimately he was released, and his persecutors put to death.

The above narrative must not be confounded with one called also 'Bel and the Dragon,' translated by Fox Talbot from the cuneiform tablets. Mr. Talbot believes that the dragon, seven-headed, like the one in Revelation, would, if the tablets were complete, prove the same being that seduced some of the heavenly "gods," or angels, from their allegiance (Rev. xii. 4; Jude vi), for which he was slain by Bel. The resemblance is not to the apocryphal book now under consideration, but to the combat between Michael and the Dragon in Rev. xii. 7-17.

Bela, bālō, the name of four Hungarian kings of the Arpad dynasty. BELA I., son of Ladislaf, competed for the crown with his brother Andrew, and was obliged to take refuge in Poland. Having there obtained assistance, he returned at the head of a powerful force, defeated his brother, who perished in the action, and mounted the throne in 1061. He immediately began a series of important reforms, and was contemplating others when he was suddenly cut off in 1063. BELA II., surnamed the Blind, because his eyes had been put out in early life by his uncle, succeeded to the throne in 1131, and at first seemed inclined to act with moderation and justice, but the vindictive spirit of his queen involved him in quarrels with his nobles, and his own intemperate habits brought on a disease which terminated his life in 1141. BELA III. succeeded his brother, Stephen III., in 1173, and held the reins of government with a strong hand, vigorously correcting the abuses and putting down the turbulent spirit which the troubles of previous reigns had engendered. He also repelled incursions of Bohemians, Poles, and Austrians, and retaking the towns of which the Venetians had possessed themselves, compelled them to accept of peace in 1189. He died

in 1196, and was succeeded by Emeric, one of two sons by his queen, a sister of Philip Augustus, king of France. BELA IV. succeeded his father, Andrew II., in 1235, and was shortly after obliged to collect an army to oppose the Tartars, who had invaded the country. In the battle which ensued he was signally defeated, and obliged to take refuge in Austria, where he was detained prisoner, and only recovered his liberty by the payment of a heavy ransom. The Tartars having retired in 1242 Bela regained his throne, and made it his object to repair the results of their invasion. He subsequently established his rule over Bosnia and northern Serbia, and died in 1270.

Bela'rius, a character of prominence in Shakespeare's 'Cymbeline.' Exiled by King Cymbeline, he carries away with him the two sons of the monarch and rears them as his own.

Belas'co, David, American dramatist: b. San Francisco, 25 July 1859. He appeared on the stage in 1874, but soon forsook it for play-writing. Alone and in collaboration, he is the author of the plays 'Lord Chumley'; 'The Wife'; 'The Charity Ball'; 'The Girl I Left Behind Me'; 'The Heart of Maryland'; 'Zaza'; 'May Blossom'; 'Men and Women'; 'La Belle Russe'; 'Valérie'; 'Du Barry'; 'Hearts of Oak'; 'Naughty Anthony'; etc.

Belbeia, bēl-bās', a town of Egypt, 29 miles north-northeast of Cairo, near the railway to Suez and on the border of the desert, formerly of some importance as being on the route to the East. The ruins of the ancient Bubastis are in its neighborhood. Pop. about 8,000.

Belch, Sir Toby, a roistering character in Shakespeare's comedy, 'Twelfth Night.'

Belcher, Sir Edward, English admiral and hydrographer: b. Halifax, N. S., 1799; d. 18 March 1877. Having taken part as midshipman in the defense of Gaeta and the battle of Algiers, he was in 1819 appointed to the Myrmidon sloop, destined for the African station, and in 1825 became assistant surveyor to the Bering Strait discovery expedition under Capt. Beechey. In 1829 he was promoted to the rank of commander, and served on the coast of Africa, and of Portugal, rendering on the latter occasion valuable services to the British residents by protecting their property during the political troubles in Portugal. Subsequently he was engaged for a number of years in a voyage round the world in the surveying vessel, *Sulphur*. In 1841 he explored the inlets of the Canton River, and materially assisted in securing the triumph of the British army. In acknowledgment of these services, he was knighted. Afterward he was employed on board of the *Samarang*, on surveying service in the East Indies, and was severely wounded while assisting the rajah of Sarawak, Sir James Brooke, to subdue the pirates of Borneo. From 1852 to 1854 he commanded the expedition in search of Sir John Franklin. On his return to England, he was tried before a court-martial for voluntarily abandoning the ships. The case against him, however, was not legally supported, he was acquitted, and his sword returned to him, but while some of the other officers were commended, his name was passed over in significant silence. In 1872 he became rear-admiral. He published 'The

Last of the Arctic Voyages' (1855); 'Narrative of a Voyage to the East Indies.'

Belcher, Jonathan, colonial governor of Massachusetts: b. Cambridge, Mass., 8 Jan. 1681; d. Elizabethtown, N. J., 31 Aug. 1757. He was graduated at Harvard, in 1699, and spent six years in Europe before returning to Boston, as a merchant. From 1730 to 1741 he was governor of Massachusetts and New Hampshire, a dispute over his salary causing his removal. In 1747 he was made governor of New Jersey and gave it a successful administration. He enlarged the charter of the College of New Jersey (Princeton) and gave that institution, among other benefactions, his own valuable library. 'The Belcher Papers' were issued by the Massachusetts Historical Society, 1893.

Belcher, Thomas Waugh, Anglican clergyman: b. Bandon, Ireland, 1831. He was educated at Trinity College, Dublin, and in the medical schools of Paris and Vienna and subsequently took orders in the Established Church. He has published 'Our Lord's Miracles of Healing Considered in Relation to Some Modern Objections and to Medical Science' (1872); 'Hygienic Aspects of Pogonotrophy' (1864); 'Reformation for Drunkards' (1862); 'Is Christ the Head of His Church in England' (1881); 'Apostolic Contumacy'; 'Life of Robert Brett' (1889). He has been rector of Frampton-Cotterell, Bristol, from 1886.

Belching, the raising of gases from the stomach. There is always a certain amount of air in the stomach, taken in by the act of swallowing and a certain amount of carbon dioxide is thought to be formed by the mucous membrane of the stomach; but under abnormal and diseased conditions new gases may be formed, causing much discomfort. Rapid eating, bolting one's food, and drinking large quantities of water very rapidly cause an abnormal amount of air to be swallowed. This often causes extreme distress until it is belched out. In abnormal states of digestion quantities of gas are formed from the fermentation of the food; some of these are acetylene gas, carbon dioxide, marsh gas, sulphuretted hydrogen, hydrogen, oxygen, and nitrogen. Lack of free hydrochloric acid is one of the most important factors in this gas formation. The symptoms are usually excessive escape of gases just preceding or closely following a meal. The gases gradually begin to form two to three hours after the meals eaten. They increase in amount, cause distress, and may be belched occasionally, making one taste one's meal. While eating, the new food dilates the stomach, causes distress, sometimes attacks of palpitation of the heart, and when the stomach is overdilated the gases are belched forth, sometimes in large gusts. The treatment consists primarily in more careful eating, but if one deliberately chooses to eat and suffer afterward, various digestants such as pepsin, or pancreatin, sodium bicarbonate, taken before the meal; weak hydrochloric acid may be taken with the meal, as well as sips of very hot water. These all aid somewhat in diminishing the excessive amount of fermentation. See INDIGESTION.

Belchite, bēl-chē'tā, a Spanish town, 22 miles south-southeast of Saragossa, noted as the scene of a victory gained 18 June 1809, by the

BELDEN—BELFAST

French, under Suchet, over the Spanish forces under Blake. Belchite has some manufactories of woollens

Belden, James Jerome, American politician: b. Fabius, N. Y., 30 Sept. 1825; d. Syracuse, N. Y., 1 Jan. 1904. He received a common school education, became a contractor and amassed a fortune in building railroads. Entering politics he became a local and State Republican leader; was elected mayor of Syracuse; elected to Congress from 1887 to 1896; and was chairman of the National Republican Committee.

Belding, Mich., city in Ionia County; on the Detroit, L. & N. R.R.; 139 miles northwest from Detroit. It has silk mills, basket, casket and furniture factories, machine shops, paper box factories and other industries. The first silk mill in the West was erected here. Pop. (1910) 4,119.

Belem, bā-liñ', a town of Portugal, on the right bank of the Tagus, two miles west-southwest of Lisbon, of which it may be considered a suburb. It contains a fine church and a monastery, the former containing the remains of Camoens and Vasco da Gama.

Belemnites, a name for straight, solid, tapering, dart-shaped fossils, popularly known as arrow-heads, thunder-bolts, finger-stones, etc., but in reality the internal shell or skeleton of a molluscous animal allied to the squid or sepia, and the type of an extinct family, *Belemnitidae*. The fossil remains of the animal are met with in the rocks of the upper secondary, both in this country and other parts of the world; and they are particularly abundant in the strata of the green sand formation in New Jersey. The part preserved, often detached from the loose strata, is a pointed cone sometimes eight inches long, of brown color and stony material, resembling in shape the head of a dart or javelin, whence their name. Belemnites are one of the earliest known fossils.

Bele'rium, or **Bolerium**, the ancient appellation of LAND'S END in Cornwall, England, but the origin of the name is uncertain.

Belfast, the chief commercial and manufacturing city of Ireland, the capital of the province of Ulster, on the river Lagan at the head of Belfast Lough, about 86 miles north-northeast of Dublin. The greater part of it is built on low alluvial land on the banks of the Lagan, not more than six feet above high-water mark. The country around is extremely beautiful; the position of the town renders its appearance from a distance by no means imposing, but the Lough itself presents a fine scene; and the slopes of the hills that bound it and partly encircle the town are thickly studded with the villas and country houses of the merchants. The sewerage has been improved. The streets are spacious, regular, and well lighted and macadamized; the houses, mostly of brick, are well built—many of them very handsome. Tramways and the electric light have been introduced. Four bridges cross the river, one of them an elegant structure of five arches, each of 50 feet span. The public buildings and institutions are in keeping with a city of its size and importance. Among the numerous churches all the chief religious bodies are represented, the Presbyterians possessing the greatest number of places of wor-

ship. Many of the churches are handsome buildings. Saint Anne's, the oldest of the Episcopal (Church of Ireland) churches, is about to be removed and the site occupied by a cathedral, of which the foundation stone was laid in 1899. Trinity, a fine specimen of Gothic; and St. George's, adorned with a beautiful portico, are also deserving of notice among the Episcopal churches. The more modern of the Presbyterian churches, as well as those of other denominations, display increasing taste. St. Patrick's serves as the Roman Catholic Cathedral, but is architecturally inferior to St. Malachy's. The secular buildings include the new city hall, Queen's College, a massive pile in the later Gothic style, with a façade 600 feet in length, erected at a cost of £30,000; the Presbyterian Theological College; the Methodist College, a handsome building erected in 1868 at a cost of £30,000; the municipal buildings; the county court-house; the commercial buildings and exchange; the buildings for the customs and inland revenue; the post-office; the offices of the Ulster Bank, the Bank of Ireland, the Provincial Bank, the Belfast Bank, the National Bank, the Scottish Amicable, Scottish Provident, and North British and Mercantile Assurance companies; the grand opera house; the Theatre Royal; the county jail; the Ulster Hall; the Albert memorial clock tower, 143 feet high; etc. Of the educational institutions the most prominent is Queen's College, first opened to students in 1849, with a president and over 20 professors and lecturers. Candidates for the ministry of the Presbyterian Church of Ireland receive a training in the General Assembly's Theological College. The Methodist College and the Campbell College (a secondary school) are important institutions; while the Royal Academy and the Royal Academical Institution also deserve mention. There is a free public library belonging to the city. The charitable institutions are very numerous and important. In the city there are six extensive public parks, besides the borough cemetery. Belfast is the centre of the Irish linen trade and manufacture, having within itself the great majority of the spinning-mills and power-loom factories in Ireland, some of them of immense size and of imposing appearance. The spinning of flax and weaving of linen are indeed the staple industries of the city, and have increased at a remarkable rate in modern times. The cotton manufacture, once of importance, is now of little moment. There are two large shipyards, and in their yard and engineering works Messrs. Harland and Wolff employ some 10,000 hands, and have turned out some of the finest vessels afloat, one of their triumphs being the great steamer Oceanic, built for the White Star line. There are also breweries, distilleries, flour-mills, oil-mills, saw-mills, foundries, printing and lithographic works, tan-yards, chemical works, aerated waterworks, rope works, tobacco manufactories, felt manufactories, etc. The commerce of Belfast surpasses that of any other Irish seaport, and is rapidly increasing. By its customs revenue it is the fifth port in the United Kingdom. Belfast Lough, which forms the approach by sea, is a fine sheet of water between the counties of Down and Antrim, about 14 miles in length and 6 in breadth at the entrance, narrowing toward the city. By dredging, a straight channel has been provided to accommodate large vessels. New docks have been constructed, giving a total

BELFAST — BELGIOJOSO

harbor area of over 100 acres. One of the grav-
ing docks is 825 feet long. The most impor-
tant branch of traffic by sea is across the channel.
 A large fleet of steamers ply regularly between
 Belfast and London, Plymouth, Bristol, Liver-
 pool, Fleetwood, Morecambe, Barrow, White-
 haven, Ardrrossan, Glasgow, Dublin, Waterford,
 etc. There is also an extensive direct trade with
 British North America, the Mediterranean,
 France, Belgium, Holland, and the Baltic. In
 1786 only 772 vessels (34,287 tons) entered the
 port; whereas in 1899, 11,263 vessels, with a
 burden of 2,539,199 tons, entered in the foreign,
 colonial, and coasting trades, while 11,172 ves-
 sels of 2,454,829 tons were cleared. Over
 2,000,000 tons entered in the trade with Great
 Britain. Much of the inland trade is carried
 on by the Lagan Navigation, which connects the
 town with Lough Neagh; the Ulster Canal, con-
 necting Lough Neagh with Enniskillen; and by
 three systems of railway, namely, the Great
 Northern, the Belfast, and Northern Counties,
 and the County Down. Belfast is comparatively
 modern. In 1637 it obtained the privilege of
 levying certain duties on goods and became a
 regular seaport; but its prosperity subsequently
 was much impeded by the Civil War. Early in
 the 18th century it was described as a hand-
 some, thriving town, but its period of modern
 prosperity dates from about 1830. The harbor
 is under the management of an independent
 board. Belfast returns four members to Parlia-
 ment. An American consul is resident here.
 Pop. (1909) 386,576.

Belfast, Maine, a city and county-seat of
 Waldo County, at the head of Penobscot Bay,
 and on the Maine C. R.R.; 30 miles from the
 ocean, and 132 miles northeast of Portland. It
 has a fine harbor, a large domestic trade, and
 important manufactures, including iron works,
 shoe factories, lumber mills and chemical works.
 The public library contains 5,000 volumes. The
 most notable industry is ship-building, begun
 here in 1793. Belfast was settled in 1770; was
 invested by the British in 1815, and was given a
 city charter in 1853. Pop. (1910) 4,618.

Belfort, bël-fôr, a fortified town of France,
 department of Haut Rhin, on the Savoureuse,
 47 miles northeast of Bésançon. It is well built,
 and has an ancient castle situated on a lofty
 rock, a fine parish church, barracks, town house,
 court of primary resort, public library contain-
 ing 20,000 volumes, and a communal college.
 Manufactures—hats, clocks, wax tapers, iron
 wire, sheet iron, etc. There are also breweries,
 tanneries, and iron furnaces. The principal
 trade is in grain, wine, brandy, and liquors. Iron
 is extensively worked in the neighborhood. In
 1814 Belfort was besieged by the allies without
 success. In the Franco-German war it was
 invested by the Germans, 3 Nov. 1870, and after
 holding out with great bravery, capitulated, 16
 Feb. 1871. In recognition of the bravery which
 the garrison had shown in its defense, it was
 allowed to march out with full military honors.
 This defense is commemorated by the huge
 'Lion of Belfort' in front of the citadel, the
 work of Bartholdi. Belfort, with the district
 immediately surrounding it, is the only part of
 the department of Haut Rhin, which remained
 to France on the cession of Alsace to Germany,
 26 Feb. 1871.

Belfry, a bell-tower or bell-turret. A bell-
 tower may be attached to another building, or
 may stand apart; a bell-turret usually rises above
 the roof of a building, and is often placed above
 the top of the western gable of a church, the
 terms bell-cote, bell-gable, being also used. The
 part of a tower containing a bell or bells is also
 called a belfry. Strictly speaking, a belfry is a
 civil and not an ecclesiastical one, and in the
 Middle Ages, the bells in the municipal belfry
 became the symbols of popular freedom. The
 detached bell tower is of frequent occurrence on
 the continent of Europe, and in England the
 cathedral of Chichester and a few parish
 churches possess such an adjunct. In the United
 States such structures are infrequent, but in
 the town of Waterville, N. Y., is a detached bel-
 fry or clock-tower with quarter chimes, and
 Brown University at Providence recently had a
 handsome detached clock tower erected within
 its grounds.

Belgæ, a group of German and Celtic
 tribes who inhabited the country extending from
 the Atlantic Ocean to the Rhine, and from the
 Marne and Seine to the southern mouth of the
 Rhine, which is united with the Meuse. From
 time to time, until the period of Cæsar, German
 nations pushed forward beyond the Rhine, partly
 expelling the Celts from their seats, partly unit-
 ing with them; and from this union sprang a
 mixed nation, which, in its language as well as
 in its manners, resembled the Germans more
 than the Celts. According to the testimony of
 Cæsar, they were the most valiant of the Gauls.
 Belgic tribes seem also to have settled in early
 Britain.

Belgard, bël'gärd, a town of Prussia, in
 Pomerania, at the junction of the Leitnitz with
 the Persante, with an old castle. Iron, cloth,
 and wood are manufactured, and there is an
 important horse market.

Belgaum, bël-gäm', a town of Hindustan,
 in the district of Belgaum, Bombay presidency,
 on the eastern slope of the western Ghats, 2,500
 feet above the sea. It consists of a native town,
 fort, and cantonments, and contains the usual
 courts and offices, a school for the children of
 natives of rank, and various other schools. In
 1818 the fort and town were taken by the British
 after a gallant resistance by the Peishwa's
 forces. From the salubrity of the climate and
 the purity of the water, Belgaum has been
 selected as a permanent military station. It car-
 ries on a trade in salt, dry fish, dates, etc.; and
 cotton is manufactured.

Belgic Confession, a credal statement put
 forth in French in 1561 by Guido de Bres of
 Brabant and others, and sent to Philip II. of
 Spain to persuade him to tolerate the Calvinistic
 faith. In 1562 it was published in the ver-
 nacular, and subsequently in Dutch and German,
 and was acknowledged by the synods of Ant-
 werp (1566) and Dort (1619).

Belgiojoso, bël-jō-yō'sō, Cristina (PRINCESS
 OF), Italian patriot: b. Milan, 28 June, 1808; d.
 there, 5 July 1871. She took a prominent part
 in the revolution of 1830, and was exiled by
 the Austrian government. She lived in Paris
 for several years and then returned to Italy in
 1847, and in the revolution of 1848, offered her
 whole fortune to the patriot cause and equipped
 several hundred volunteers at her own expense.
 After a second exile of some years she returned

BELGIOJOSO — BELGIUM

under the amnesty of 1856, regained her property, and supported the policy of Cavour. She was the editor of several different periodicals in the interest of Italian liberty, and was the author of several books, among them 'Souvenirs of Exile' (1850); 'History of the House of Savoy' (1860); and 'Reflections on the Actual Condition of Italy' (1869).

Belgiojoso, a town of northern Italy, in the province and eight miles southeast of Pavia. It is situated in a beautiful and fertile plain between the Po and the Olona, and is well built, containing a parish and an auxiliary church. The old castle, in which Francis I. was temporarily lodged after being taken prisoner at the battle of Pavia, in 1525, has been converted into a magnificent château, surrounded by fine gardens. Pop. 4,000.

Belgium (French, Belgique; German, Belgien), a kingdom of Europe, bounded north by Holland, northwest by the North Sea, west and south by France, and east by the duchy of Luxemburg, Rhenish Prussia, and Dutch Limburg; greatest length, northwest to southeast, 165 miles; greatest breadth, north to south, 120 miles; area, about 11,400 square miles. Belgium, in shape, resembles a triangle, which has its vertex in the west; the base resting on Germany on the east, the shorter side facing Holland and the sea, and the larger forming the frontier of France. For administrative purposes it is divided into nine provinces—Antwerp, South Brabant, East Flanders, West Flanders, Hainaut, Liège, Limburg, Luxemburg, and Namur. These provinces do not differ much in area, and are so arranged as to form a compact and commodious division of the kingdom. South Brabant, which from containing Brussels, the capital, may be considered the metropolitan province, occupies the centre, while the others cluster round, and, with the exception of the extreme provinces of Luxemburg and West Flanders, actually touch it.

The following table shows the areas of the provinces, with their population, 31 Dec. 1900:

Provinces	Area in sq. miles	Pop- ulation
Antwerp	1,093	819,000
Brabant	1,268	1,263,807
Flanders, East	1,158	1,029,971
Flanders, West	1,249	805,236
Hainaut	1,437	1,142,954
Liège	1,117	820,175
Limburg	931	240,796
Luxemburg	1,706	219,200
Namur	1,414	346,512
	11,373	6,687,651

The population 31 Dec. 1909 was 7,451,903.

Physical Features.—A general idea of the surface of the country may be obtained by regarding it as an inclined plane, somewhat rugged, and considerably elevated in the southeast, from which it slopes, more or less gradually, north and west, till it sinks into low plains, only a few feet above the level of the sea. The elevated districts are formed by ramifications of the Ardennes, which, entering Belgium from France, stretch along the south of Namur, occupy the greater part of Luxemburg, and attain their culminating point in the southeast of Liège at Stavelot, in the neighborhood of Spa, where the height exceeds 2,000 feet. The rocks appear to rest on primary formations; but

those which reach the surface generally consist of slate, old red sandstone, and mountain limestone. Proceeding northwest, in the direction of the dip, these rocks take a cover, and the coal formation becomes fully developed. This coal field is a continuation of that of the north of France, and stretches through Belgium in a northeast direction, occupying the greater part of the province of Hainaut, and a considerable part of that of Liège, and skirting the provinces of Namur and Luxemburg. It contains numerous workable seams, both of coal and iron. North and west, beyond the limits of this coal field, a more recent formation is found, covered by deep beds of clay and sand, the former prevailing more in the interior, and the latter near the coast, where it has been drifted into hillocks or downs, and forms the only barrier against the encroachments of the sea. Some of the clay in this district is fit for the manufacture of fine pottery; but the greater part of it is fit only for coarse ware, or for bricks.

In accordance with the general slope of the surface already mentioned, the main streams of Belgium have a northern direction; and the whole country lies within the basin of the German Ocean. In the southeast, where the surface is elevated and broken, numerous torrents descend with rapidity; and becoming confined within rocky, precipitous, and richly wooded banks, often furnish, if not the grandest, the most picturesque and enchanting of landscapes. On reaching the lower country their speed is slackened, and their augmented volume moves along in a slow, winding course. Only two of them,—the Meuse and the Scheldt,—have a magnitude which entitles them to the name of rivers; but so important are these two in themselves, and so numerous their affluents, that no country in Europe is better supplied with water communication. Besides the Scheldt or Schelde, and Meuse or Maas, the navigable streams are the Ambleve, Demer, Dender, Darne, Dyle, Lys, Great Nethe, Little Nethe, Ourthe, Rupel, Sambre, Yperlee, and Yser. The climate of Belgium bears a considerable resemblance to that of the same latitudes in England. Though subject to sudden change, it is on the whole temperate and agreeable. Luxemburg and Namur, where the surface is high, and the numerous hills and dales which diversify it both cheer the animal spirits and freely circulate an air at once keen and pure, are most favorable to health and longevity. The only parts of the country which can be considered unhealthy are the low flats which prevail in Flanders, and the polders or rich alluvial tracts which have been gained from the rivers by embankment, chiefly in Antwerp. There agues and other diseases engendered by a humid and sluggish atmosphere are prevalent.

Woods and Forests.—Nearly one fifth of the whole surface of the kingdom is occupied by wood. The distribution of it, however, is by no means equal; and hence, while the two Flanders and Antwerp fall far below the average amount, Luxemburg and Namur rise far above it, and are very densely wooded. In these provinces extensive tracts are covered with natural woods, in which the wolf and wild boar still have their haunts. These woods are the remains of the ancient forest of Ardennes, which Cæsar describes as stretching far out into France from the banks of the Rhine. They consist of hard wood, principally oak, which is often of great

BELGIUM

size, and furnish large quantities of the most valuable timber. By carefully dressing the stools after it is cut, a fine oak copse is raised, the cuttings of which annually produces many tons of bark, which not only supplies the tanneries of the country, but leaves a considerable surplus for exportation, chiefly to England, while the wood unfit for the carpenter is partly employed as fuel and partly converted into charcoal for the use of the iron works, where the superiority of the iron smelted and wrought by it is well known. South Brabant also possesses several fine forests, among others that of Soignies, with which the field of Waterloo has made us familiar. In the other provinces scarcely anything deserving the name of forest is seen. Wood is distributed over them in occasional patches, and more frequently in the form of hedge-row. The timber thus grown is by no means small in aggregate amount, and forms a well-known feature in the rich rural landscapes which the old Flemish masters loved to paint; but taking into account the injury which the cultivated crops sustain from it, it is very questionable whether it ought to be regarded as a source of profit either to individual proprietors or to the country at large. The timber itself, consisting principally of various kinds of poplar, is soft and of an inferior description.

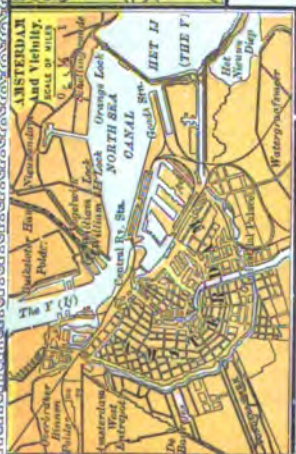
Agriculture.—The greater part of the country is well adapted for agricultural operations, and the inhabitants have so happily availed themselves of their natural advantages that they early began, and in some respects still deserve, to be regarded as the model farmers of Europe. In the high lands traversed by the Ardennes the climate is ungenial, and the soil so shallow and stony as almost to forbid the labor of the plow. Here the occupants display their skill, not so much by what they do, as by what they refrain from attempting. Instead of vain endeavors to force the growth of corn where it could never yield an adequate return, they have been contented to turn the natural pastures of the district to the best account by employing themselves chiefly in the raising of stock. In particular they produce a hardy breed of horses, which, being admirably adapted for light cavalry, are largely exported to France for that purpose, while vast herds of swine are fed almost at no expense on the mast of the forests. At the same time no part of the surface is allowed to lie waste. Where arable land occurs it is carefully applied to its proper use. Even the vine has not been forgotten, and sunny slopes on which little else could have been grown have been made to yield a tolerable wine. In the Ardennes valleys an inferior quality of tobacco is raised.

In the opposite extremity of Belgium, chiefly in the province of Antwerp, and partly in that of Limburg, an extensive tract occurs which strikingly contrasts in appearance with the hilly districts of the southeast, but is perhaps still less adapted for the ordinary operations of agriculture. This tract, known by the name of Campine, is a vast expanse of moorland waste of the most dreary appearance, a dead monotonous flat composed for the most part of barren sand, in which the ordinary heaths and lichens will scarcely grow. The greater part of this tract seems destined to remain forever in its natural state, but whenever a patch of more promising appearance occurs the hand of industry has been at work, and corn fields and green

pastures have become not infrequent even in the Campine. Agricultural colonies, partly free and partly compulsory, have been planted in different parts of the district. The former consist of persons generally in poor circumstances who have voluntarily engaged in reclaiming barren tracts as the means of procuring a maintenance and saving them from the degradation of pauperism. The latter consist of convicts, who, having forfeited their liberty, give compulsory labor as the penalty of their offenses. By the united exertions of both a wondrous improvement has been made, and on parts of this waste some of the finest cattle of the country are raised, and much dairy produce of excellent quality is obtained. Still, however, about 300,000 acres remain untouched.

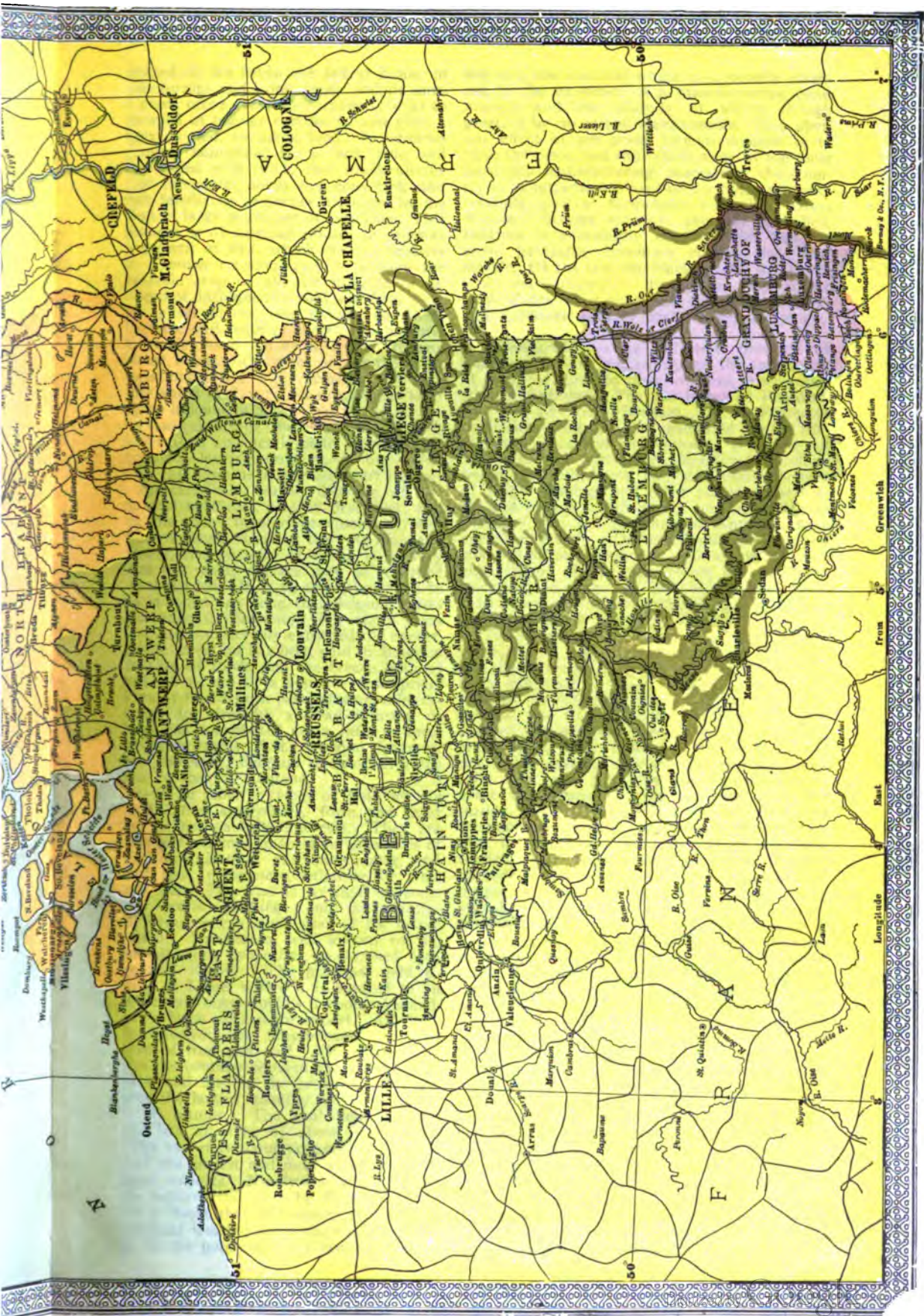
With the exception of the two districts just described, there is no part of Belgium in which agriculture does not flourish; but the husbandry which has been so much lauded is seen in its greatest perfection in the two Flanders. Its excellence is owing not to any superior knowledge of what may be called the theory of agriculture, nor to any remarkable ingenuity in the invention of implements by which its operations are more efficiently or more cheaply performed, but chiefly to an innate spirit of economy and industry—an economy which carefully appropriates every gain, however small, and an industry which grudges no labor, however great, provided it is possible, by the application of it, to obtain an additional amount of valuable produce. In fact, the Flemish husbandry partakes more of the nature of garden than of field culture. In many of its operations, no doubt, horse labor is employed. The plow and the harrow are in frequent requisition, but the implement on which the greatest dependence is placed is the earliest and simplest of all—the spade. To give full scope for the use of it, the ground is parceled out into small fields of a square form, which have their highest point in the centre, and slope gently from it in all directions toward the sides, where ditches of sufficient size carry off the superfluous water as it filters into them. To promote this filtration the ground is trenched to a uniform depth, so that the slope of the subsoil corresponds as nearly as possible to that of the surface. In performing this trenching a considerable degree of skill and ingenuity is displayed. The performance of the whole at once would be a formidable and not a very efficient process. In a few years a new subsoil would be formed, and the trenching would require to be renewed. This is rendered unnecessary in the following manner: The land is laid out in ridges about five feet wide, and when the seed is sown it is not covered as usual by the harrow, but by earth dug from the furrows to the depth of two spits, and spread evenly over the surface. By changing the ridges and throwing the furrow of the previous year into the ridge of the next, the whole ground becomes furrow in the course of five successive crops, and is consequently trenched to the depth of about 18 inches. This process of trenching never ceases, and is unquestionably one of the most important characteristics of the Flemish husbandry.

The only other process particularly deserving of notice is the care and skill manifested in securing an adequate supply of manure. Every farm is fully stocked, and the cattle, instead of



NETHERLANDS
AND
BELGIUM.





BELGIUM

being grazed in the fields, are fed at home, in winter on turnips and other roots, and in summer on green crops carefully arranged, so as to come forward in regular succession, and yield a full supply of rich, succulent food. In addition to this, every homestead has a tank, built and generally arched with brick, into which all the liquids of the cattle sheds are conveyed, and have their fertilizing properties increased by the dissolution of large quantities of rape cake. This liquid manure is of singular efficacy in promoting the growth of flax, which enters regularly into the Flemish rotation, and is perhaps the most valuable crop of all, the produce of an acre being not infrequently sold for \$250. As this crop is one of the most exhausting which can be grown, and requires the richest manure, while it yields none, the growth of it to any great extent must, without the aid of the tank, have been impossible. Nevertheless by this system the value of flax raised in 1908 has been estimated to amount to \$7,500,000.

About two thirds of the whole kingdom is under cultivation, and nearly eight ninths profitably occupied, leaving only about one ninth waste. Of this last the far greater part belongs to the comparatively barren districts of the southeast and northeast, already described; and hence, in the more favored provinces, particularly those of South Brabant, the two Flanders, and Hainaut, the quantity of waste is so very small that the whole surface may be regarded as one vast garden. It is an error, however, to assert, as is sometimes done, that Belgium raises more corn than it consumes. For many years the import has considerably exceeded the export. Considerable attention has been paid in Belgium to the raising of stock, and the breeds both of cattle and horses are of a superior description. The horses of Flanders in particular are admirably adapted for draught, and an infusion of their blood has contributed not a little to form the magnificent teams of the London draymen. In general, however, Belgium stock of all kinds is inferior to that of England.

Mines.—The mineral riches of Belgium are great, and, after agriculture, form the most important of her national interests. They are almost entirely confined to the four provinces of Hainaut, Liège, Namur, and Luxemburg, and consist of lead, manganese, calamine or zinc, iron, and coal. The lead is wrought to some extent at Vedrin, in Liège; but the quantity obtained forms only a small part of the actual consumption. Manganese, well known for its important bleaching properties, is obtained both in Liège and Namur. The principal field of calamine is at Liège, where it is worked to an extent which not only supplies the home demand, but leaves a large surplus for export. All these minerals, however, are insignificant compared with those of iron and coal. The former has its seat in the country between the Sambre and the Meuse, and also in the province of Liège. At present the largest quantity of ore is mined in that of Namur. The coal field, already described, has an area of above 500 square miles. The export is about 5,000,000 tons, forming one of the largest and most valuable of all the Belgian exports. Nearly the whole of the coal thus exported is taken by France. There cannot be a doubt that this export adds largely to the national wealth; but a question has been raised as to the policy of thus lavishly dispos-

ing of a raw material which is absolutely essential to the existence of a manufacturing community, and the quantity of which, though great, is by no means inexhaustible. One obvious effect of the great foreign demand is to raise the price, and thus place some of the most important manufacturing interests of the country in an unfavorable position for competing successfully with so formidable a rival as Great Britain. Besides minerals, properly so called, Belgium is abundantly supplied with building stone, pavement, limestone, roofing slate, and marble. Of the last, the black marble of Dinant is the most celebrated. In the year 1909, 318,000 tons of ore were produced, valued at \$286,000, and 23,780,000 tons of coal, valued at \$76,000,000.

Manufactures.—The industrial products of Belgium are very numerous, and the superiority of many of them to those of most other countries is confessed. The fine linens of Flanders, and lace of South Brabant, are of European reputation. Scarcely less celebrated are the carpets and porcelain of Tournay, the cloth of Verviers, the extensive foundries, machine works, and other iron and steel establishments of Liège, Seraing, and other places. The cotton and woolen manufactures, confined chiefly to Flanders and the province of Antwerp, have advanced greatly. Other manufactures include silks, glass and glassware, hosiery, paper, beet sugar, beer. There were 16 pig iron works in operation in 1909; 38 iron manufactories; 34 steel works; 97 sugar factories, and 23 refineries; and 135 distilleries.

Trade and Commerce.—The geographical position, the admirable facilities of transport, and the indefatigable industry of the inhabitants, early combined to place Belgium at the very head of the trading countries of Europe. The gradual rise of competitors still more highly favored has deprived her of this pre-eminence, and with the limited extent of her seacoast it is not to be expected that she can ever take high rank as a naval state; but her trade is still of great importance, and within recent years has made a rapid advance. Her coal and iron, and the numerous products of her manufactures, furnish in themselves the materials of extensive traffic; while the possession of one of the best harbors in the world (Antwerp), situated on a magnificent river, which directly, or by canals, stretches its arms into every part of the kingdom, and now made accessible by a system of railways with every kingdom of central Europe, naturally renders Belgium the seat of a transit trade even more important than that which it monopolized during the Middle Ages. This she owes chiefly to the admirable system of railway communication which, in the exercise of an enlightened policy, was early established throughout the kingdom. This system has its centre at Malines, from which a line proceeds north to Antwerp; another west to Ostend; another southwest through Mons, and on to the Northern R.R. of France, which communicates directly with Paris, and another southeast to Liège, and on into Prussia, where it first communicates with the Rhine at Cologne, and thence by that river and by rail gains access both east and south to all the countries of central Europe. In addition to these great trunks, one important branch connects Liège with Namur and Mons; and another from Antwerp,

BELGIUM

after crossing the west trunk at Ghent, passes Courtray, and proceeds directly toward Lille. The ramification is thus complete; and there is not a town in Belgium of any importance which may not now, with the utmost facility, convey the products of its industry by the safest and speediest of all means of transport. The railways have a length of about 2,900 miles, three fourths belonging to the state. The value of the general commerce in 1909 was: Imports, \$1,002,000,000, and exports, \$849,000,000; imports for home consumption, \$708,000,000; exports of Belgian produce and manufactures, \$536,000,000; transit trade, \$440,000,000.

The articles of import for home consumption include grain and flour, raw cotton, wool, hides, coffee, tobacco, chemicals, oil-seeds, yarn, timber, petroleum, etc. The exports are principally coal, yarn (chiefly linen and woolen), cereals, machinery, flax, woolens and cottons, chemicals, steel and iron, glass and glassware, sugar (raw and refined), zinc, manure, eggs, etc. The trade with Great Britain has grown considerably of late years; for while in 1869 the exports to Great Britain amounted to \$46,957,015, and the imports of British produce from Great Britain to \$20,017,675, these were in 1898 respectively \$107,670,000 and \$69,254,500. The chief exports to Great Britain are silks, woolen yarn, cottons, flax, glass, eggs; the chief imports cottons, woolens, raw cotton, metals, and machinery. The trade with France is even greater than with Great Britain. The external trade is chiefly carried on by means of foreign (British) vessels, and the great bulk of the shipping enters and clears from the port of Antwerp. Of the tonnage entered in 1896 only about seven per cent belonged to the Belgian flag. The total burden of the Belgian mercantile marine is over 113,250 tons. Important results are expected from the *Association Belgo-Hollandaise*, an international association of Belgian and Dutch manufacturers and business men founded in 1903 to effect a closer commercial union between the two countries. The trade with the United States is important, Belgium being classed as fifth in the value of its imports from this country and seventh in the exports it sends hither.

People.—The Belgian population is the densest in Europe, and is composed of two distinct races—Flemish, who are of German, and Walloons, who are of French extraction. The former, by far the more numerous, have their principal locality in Flanders; but also prevail throughout Antwerp, Limburg, and part of South Brabant. The latter are found chiefly in Hainaut, Liège, Namur, and part of Luxemburg. The language of each corresponds with their origin—the Flemings speaking a Germanic dialect, and the Walloons a dialect, or rather a corruption, of French, with a considerable infusion of words and phrases from Spanish and other languages. This distinct mixture of races, and the repeated changes of masters to which they have been subjected, have necessarily been very unfavorable to the formation of a national character. Still, in some leading features there is a remarkable uniformity in the population. Though the position of the country between France and Germany has made it the battlefield of Europe, the inhabitants show few warlike tendencies, and are unwearied in pursuing arts of peace. The fact bears

strong testimony to the patient endurance of the Belgians, but bespeaks, perhaps, a deficiency of physical and moral courage.

Almost the entire population belong to the Roman Catholic Church. Protestantism is fully tolerated, and even salaried by the state, but cannot count above a mere fraction (some 10,000) of the population among its adherents. An interesting circumstance connected with this state of matters is, that Belgium early embraced, and at one time seemed on the eve of being gained to the Reformation. Persecution did what perhaps it has never done in any other part of the world—not only forced the people back to a religion which they had given up, but induced them to return to it as willing converts. The country is divided into six dioceses, each of which possesses an ecclesiastical seminary. Monks and nuns are numerous, especially the latter (over 25,000). Education is in a very unsatisfactory state. At the census of 1890 nearly 27 per cent of the population above 15 years of age could neither read nor write. By law each commune must have an elementary school, and the expense of primary instruction falls partly upon the communes, partly upon the state. In all the towns colleges and middle-class schools have been established, where a superior education may be obtained; while a complete course for the learned professions is provided by four universities, two of them, at Ghent and Liège respectively, established and supported by the state; one at Brussels, called the Free University, founded by voluntary association; and one at Louvain, called the Catholic University, controlled by the clergy. French is the official language of Belgium and in general use among the educated classes, and there can scarcely be said to be a national literature. Of late, however, patriotic feelings, to which the Belgians were too long strangers, have acquired new strength; and one of its first manifestations has been an eager desire to cultivate the vernacular Flemish, which differs little from Dutch.

The population generally is industrious, and apparently in comfortable circumstances. The far larger proportion of it is rural; and though landed property is very much subdivided, the Belgians, instead of exhibiting the wretchedness so common among the small occupiers in Ireland, manage, by a happy combination of agricultural with other industrial employments, to derive from their little holdings all the necessities and not a few of the comforts of life. It is not to be denied, however, that in some of the provinces, particularly in Flanders, population, in so far at least as it can be maintained by agricultural resources, has reached its limit, and that a deficiency of other employment, particularly spinning and hand-loom weaving, has placed large numbers on, if not within, the verge of pauperism. In Flanders and South Brabant a fourth of the people is dependent on total or occasional relief; and pauper riots have repeatedly occurred. Still the population continues to increase, as if with accelerated pace.

Government.—The Belgian constitution combines monarchical with a strong infusion of the democratic principle. The executive power is vested in a hereditary king; the legislative in the king and two chambers,—the Senate and the Chamber of Representatives,—the former elected for eight years, the latter for four, but one half

BELGIUM



THE KING AND QUEEN OF BELGIUM,
With their two children.

BELGIUM

of the former renewable every four years, and one half of the latter every two years. The senators are elected partly directly, partly indirectly (by the provincial councils), and must be 40 years of age. Their numbers depend on population. The deputies or representatives are elected directly, one for every 40,000 inhabitants at most. All citizens of 25 years of age are electors, and according to certain qualifications one elector may have three votes. Each deputy is allowed \$800 per annum, and a free railway pass between his place of residence and the capital. The army is raised by conscription, to which every able man who has completed his 19th year is liable, and also by voluntary enlistment. The peace strength of the army in 1910 amounted to 37,000 officers and men; in time of war the total strength is about 165,000 men. Besides this standing army there is a *garde civique*, numbering about 43,000 men in time of peace, in addition to which there are 90,000 non-active men belonging to this force. The navy is confined to a few steamers and a small flotilla of gunboats. The estimated revenue for 1910, chiefly from railways, customs, excise, and direct taxation, was \$118,406,512; the estimated expenditure, \$118,324,805. About one fourth of the expenditure is in payment of the interest of the national debt, the total of which in 1910 was \$683,836,080. The coins, weights, and measures are the same, both in name and value, as those of France.

History.—The history of Belgium as a separate kingdom, beginning in 1830, when it was constituted an independent European state, would not truly represent the life of the people, or account even for the events of the period embraced in it. Situated between the two leading states of Europe, and deeply interested in all the political agitations resulting alike from their rivalries and their alliances, the Belgian people often changed masters. Moreover, the Belgian territory contained within itself one leading element of the dissensions which raged around it. The two great races of different origin and habits, the Celtic and Teutonic, or Latin and German-speaking peoples, whose different policies have divided Europe from the time of the Romans, were combined in its population, the Walloon provinces, Hainaut, Namur, Luxemburg, being nearly allied to the French, while Flanders, Brabant, and Limburg approximated more in character and language to the Germans. Thus not only were the great rivalries of Europe represented here in miniature, but their compression within the narrow limits of what is now one of the smallest of European states, has resulted in the formation of a distinct national character. While, therefore, the chief events in which Belgium was interested prior to 1830 are matters of European history, a brief outline of them is needed here to give a distinct conception of the character of the people which they contributed to form.

The territory anciently known as Belgium differed considerably from that which has assumed the name in modern times. According to Cæsar the territory of the Belgæ, who were one of the principal tribes of ancient Gaul, extended from the right bank of the Seine to the left bank of the Rhine, and to the ocean. This district continued under Roman sway till the decline of the empire, and subsequently formed part of the kingdom of Clovis, who subdued

nearly the whole of Gaul from the Rhine to the Mediterranean. The Franks at this time did not recognize the law of primogeniture. On the death of a monarch his dominions were divided among his sons, the more ambitious of whom again strove to reunite them under their own sway. Thus the Frankish kingdoms under the descendants of Clovis were subject to continual vicissitudes, in which the Belgian territory shared, forming successively a portion of the kingdoms of Metz, Soissons, and Austrasia, till the whole was reunited under Charlemagne or Charles the Great. This great conqueror and administrator, the first who strove to unite the states of Europe in a civilized commonwealth, was of Belgian extraction. It was at Landen and Herstal, on the confines of the forest of Ardennes, that his predecessors, the great mayors of the palace, held sway, while his own capital was established at Aix. Charlemagne in great measure destroyed his own work by adopting the Frankish custom of dividing his kingdom among his sons at his death. This practice, which had proved so disastrous to the dynasty of Clovis, was continued for some time in his family, but was ultimately abolished in France. It long prevailed among the principalities of Germany, warring their unity, and contributing to the ascendancy of France in Europe. Thus Belgium fell to Lothaire, the grandson of Charlemagne, forming part of the kingdom of Lotharingia, which was dependent on the German empire; but by the treaty of Verdun (843) Artois and Flanders were united to France.

For more than a century this kingdom was contended for by the kings of France and the emperors of Germany. In 953 it was conferred by the Emperor Otto upon Bruno, Archbishop of Cologne, who assumed the title of archduke, and divided it into two duchies: Upper Lorraine, containing modern Lorraine, Luxemburg, and the dioceses of Metz, Toul, Verdun, and the Palatinate; and Lower Lorraine, containing Brabant, Guelders, the bishoprics of Cologne, Liège, and Cambray. These duchies were temporarily reunited under Gonthelmo I., Duke of Lower Lorraine, who acquired Upper Lorraine in 1033. Among the dukes of Lower Lorraine may also be mentioned Godfrey of Bouillon, the great Crusade leader, who, in 1099, was crowned king of Jerusalem.

The feudal system, which had established itself over the greater part of Europe, likewise prevailed in the Belgian territory, which in the 11th century was divided into duchies, counties, and marquisates, under the sway of chiefs owing allegiance to the empire, or other of the greater princes, but exercising an almost absolute dominion over their own subjects. Thus were formed the counties of Holland, Brabant, Zealand, Friesland, Namur, Hainaut; the duchies of Limburg, Guelders, Juliers, Luxemburg; the marquisate of Antwerp, and others. In the frequent struggles which took place during this period, Luxemburg, Namur, Hainaut, and Liège were usually found siding with France, while Brabant, Holland, and Flanders commonly took the side of Germany. The princes and the people, however, particularly of Flanders, were not always found on the same side.

The 12th and 13th centuries were distinguished by a general uprising of the industrial communities, which had begun to grow in importance throughout Europe, against the

BELGIUM

feudal system. This movement was very strongly manifested throughout the Netherlands, less strongly perhaps in Belgium than in Holland. In both countries prosperous municipalities began to arise and assert their freedom; but the spirit of centralization, more strongly developed among the Latin-speaking races, prevailed more in the southern provinces, while the love of individual liberty, more characteristic of the German races, was more strongly manifested in the north. Many of the towns of Flanders and Brabant, however, became extremely democratic. Ghent in particular distinguished itself for the violence and frequency of its revolts against its rulers.

From this time the popular and civic element began to count for something in political combinations. If one potentate secured the alliance of a count, another might strengthen himself by secretly encouraging insurrection in his towns. The people of Flanders often allied themselves with the English, with whom their commercial intercourse and their love of freedom gave them many common interests and feelings, and both their own counts and the French monarchy often felt the effects of this alliance.

The battle of Courtray in 1302 greatly weakened the feudal authority, but the ascendancy of the popular element led to various excesses. The organization of popular power was reserved for a later age, and the battle of Rosebeque, 1382, in which the Ghentese under Philip van Artevelde (who had offered the crown of France to Richard II. of England as the price of his assistance) were totally defeated, restored the authority of the nobles. In 1384, Flanders and Artois fell to the house of Burgundy by the marriage of the Duke, a scion of the French crown, with Margaret, daughter of Louis II., Count of Nevers, the last ruler of these provinces. By a succession of happy marriages, by purchase, or by force, Holland, Zealand, Hainaut, Brabant, Limburg, Antwerp, and Namur had all by 1430 become the inheritance of the same house. In 1442 the duchy of Luxemburg was acquired, and in 1470 Guelders and Friesland. This extraordinary prosperity induced Charles the Bold, who succeeded in 1467, to attempt to unite his territories by the conquest of Alsace, Lorraine, and Liège, and raise his duchy to a kingdom. The details of this enterprise, which forms one of the most exciting episodes in European history, belong more immediately to the history of France. It ended in his defeat and death at the battle of Nancy in 1477. His daughter, Mary, who succeeded him, carried the fortunes of her house still higher, or rather she carried them into a house still more fortunate than her own, by her union with the Archduke Maximilian, son of the Emperor Frederick. Her splendid possessions had been coveted by many potentates, and there were five candidates for her hand, among whom the most important were the dauphin, son of Louis XI., and the archduke.

It now became the part of France to excite troubles in Flanders. The policy of Maximilian, conformably to the traditions of the house of Austria, was directed to the aggrandizement of his house. He was frequently at feud with his Netherlandish subjects, whose manners he took little pains to understand, and for whose liberties he had little respect. Wars and leagues

succeeded each other, which belong to the history of the great states of Europe. The Netherlands were by this union again brought under the German empire, and especially under the house of Austria, destined soon to become the most powerful in Europe. In 1512 they were formed into a division of the empire, under the title of the circle of Burgundy. East Friesland was included in the circle of Westphalia. On being called to the empire, Maximilian conferred the government of the Netherlands on his son, Philip the Fair, under whom they began to experience the material advantages of an alliance with the house of Austria. The vast European possessions of this house opened up to its subjects the greatest facilities of the age for commercial intercourse, while the discovery of America gave them in addition the commerce of a new world. The industrial skill and enterprise of the Netherlanders fitted them much more than the Spaniards, whose haughty disposition made them apt to substitute rapacity for industry, to derive permanent benefit from these opportunities. Margaret, the aunt, and Mary, the sister of Charles V., who succeeded to the government of the Low Countries, exercised it in many respects wisely and well. The former, a patroness of arts and letters, kept her court surrounded with poets, artists, and men of learning. A Council of State, consisting of the governors or stadtholders of the 17 provinces, assisted them in the administration of affairs, and such was the prosperity of the country that more than one of the cities of the Netherlands rivaled in extent and opulence the capitals of the greatest European kingdoms. This bright day was too soon clouded. The reign of Charles V. is less distinguished for the political struggles excited by a too prosperous ambition, which shook nearly every nation of Europe, than for the religious dissensions, and the social troubles resulting from them, which attended the dawn of the Reformation. The reformed opinions made great progress in the Netherlands; but here again a remarkable illustration was afforded of the strength of those differences of race, language, and sentiment which divided their populations. In Holland, as in Germany, the Reformation triumphed. On the Belgian territory, especially where the Walloon or French element of the population prevailed, although these opinions spread widely, they yielded at length, as in France, to the force of authority, or the sentiment of unity. In 1535 Mary published at Brussels an edict condemning all heretics to death. An insurrection excited by persecution was suppressed by Charles V. in 1540, and the Netherlands were inseparably united by the law of primogeniture with the crown of Spain. No union could have been more unfortunate. The bigotry of the Spanish branch of the Austrian family has become proverbial, and a country torn with religious dissensions could not have found itself under a worse rule.

Charles V., himself a Netherlander, born in Ghent, and still more his son, Philip II., of Spain, strove to extinguish the reformed opinions among the Netherland subjects in seas of blood. Philip discarded all respect for the liberties of the Netherlands, and subjected them under his governors, particularly the Duke of Alva, to all the horrors of a hostile military rule. Thousands of victims perished by every variety of execution which a barbarous cruelty

BELGIUM



1. The Bourse, Brussels.

2. Boulevard Anspach, Brussels.

BELGIUM

could devise, hanging, beheading, burning, drowning, interring alive; to which tortures and imprisonments were added in still greater number. During this period of desolation, great numbers of artisans, abandoning their country, carried elsewhere, especially to England and Germany, which sympathized with their opinions, the arts which had enriched their own country, and which now acquired through them a wider scope, and contributed to the industrial progress of Europe. William of Orange, the Silent, now made himself the champion of the liberties of his country. Supported chiefly by the northern states, thwarted by the jealousy of the Flemish nobles, and opposed by the Walloon provinces, which remained faithful to Spain, and even supplied her with troops, he at length succeeded in freeing the seven northern states, and forming them into the confederation of the United Provinces, whose independence, declared in 1581, was ultimately acknowledged by Spain. These events belonged chiefly to the history of Holland.

Requesens, the successor of Alva, had tried too late a more humane policy. At Antwerp and Ghent the Spanish soldiers broke out into excesses. The confederates assembled in the latter town signed the pacification of Ghent, proclaiming liberty of conscience, and convoking the Estates-General. The Estates called in the aid of France, and offered the crown to Henry III., who declined to accept it, dreading the Roman Catholic league in his own country. It is a special feature of the history of those days, that while the great rulers, particularly those of France and Germany, persecuted their reformed subjects, each was ready to protect the Protestant subjects of the others when opposed to their political policy. The success of the revolutionary party, consummated in the north, was at length checked in the southern provinces by the ability of Alexander Farnes, Duke of Parma, the Spanish commander, and by the reactionary spirit evoked in the provinces themselves, strengthened by the emigration of many influential reformers to the northern states, and the Belgian Netherlands remained attached to Spain. From 1596 to 1633 the Spanish Netherlands were transferred to the Austrian branch of the family by the marriage of Isabella, daughter of Philip II., with the Archduke Albert of Austria. On the death of Isabella they reverted to Spain. By the Treaty of Rastadt in 1714 they were again placed under the dominion of Austria. During this period they were the subject of continual intrigues, and frequently of open warfare among the European states. Twice conquered by Louis XIV., conquered again by Marlborough, coveted by Holland, Spain, Germany, France, and England, they lay continually open to the invasions and the struggles of foreign armies, and it was at this period especially that they were, as they have been called, the battlefield of Europe. Some portions of maritime Flanders, Brabant, and Limburg, which had remained to Spain, were during this period conquered and annexed by Holland, while France acquired Artois and Walloon Flanders, the south of Hainaut, and part of Namur and Luxembourg, including the important towns of Douai, Lille, Valenciennes, Dunkirk, and many others. From 1714 Austria was left in undisturbed possession of the remainder of the southern Netherlands. Joseph II., styled the Philosophical

Emperor, excited by his reforms a revolt, headed or stimulated by the monks of Flanders and Brabant, whom he had dispossessed of their convents. The Estates of the two provinces refused to vote the imposts, and were dissolved. The populace took to arms. The Virgin was proclaimed generalissimo of the patriot army. The Austrian army concentrated at Turnhout was totally defeated. After applying in vain for assistance to Holland and France, neither of which could be expected to have much sympathy with their movement, the insurgents were at length subdued, and the Austrians re-entered Brussels, October 1790. Soon after the whole Netherlands were conquered by the revolutionary armies of France, and the country was divided into French departments, a change which, as might be expected, provoked as much resistance as the people were able to offer. When Napoleon ruled France, his brother Louis became king of Holland.

Just before the battle of Waterloo, fought on Belgian territory, had once more changed the fate of Europe, Belgium was united by the Congress of Vienna to Holland, under the title of the kingdom of the Netherlands. This fusion had much to recommend it. The ports and colonies of the north formed a suitable complement to the arts and industry of the south. The Flemings and the Dutch spoke the same language and had the same origin; but there remained outside of this harmony the Walloon provinces, French in language and extraction. A most injudicious measure of the Dutch government, an attempt to assimilate the language of the provinces by prohibiting the use of French in the courts of justice, excited an opposition, which, encouraged, by the success of the French revolution of 1830, broke out into revolt. The electoral system, moreover, gave the preponderance to the northern provinces, though inferior in population, and the interests of the provinces were diametrically opposed in matters of taxation. Belgium was agricultural and manufacturing, Holland commercial; the one wished to tax imports and exports, the other property and industry. In the chambers three different languages were spoken, Dutch, German, and French; and the members frequently did not understand each other. Nothing but the most skilful government could have overcome these difficulties, and no statesman appeared fitted to grapple with them. The revolutionary movement became general in the south, and the Dutch troops, at first successful before Brussels, were finally repulsed, and compelled by the arrival of fresh bands of insurgents from all quarters, to retire. The Flemings saluted the volunteers of Liège, Mons, and Tournay by the ancient title of Belgians, and this name, which properly distinguished only a section of the people of the southern provinces, became henceforth recognized as the patriotic designation of the whole.

A convention of the great powers assembled in London to determine on the affairs of the Netherlands and stop the effusion of blood. It favored the separation of the provinces, and drew up a treaty to regulate it. In the meantime the National Congress of Belgium offered the crown to the Duke of Nemours, second son of Louis Philippe, and, on his declining it, they offered it, on the recommendation of England, to Leopold, Prince of Saxe-Coburg, who acceded

to it under the title of Leopold I., on 21 July 1831. In November of the same year the five powers guaranteed the crown to him by the Treaty of London. Some disputes with Holland in regard to the partition of territories still remained. A convention was concluded between France and England to bring these differences to a close, and in 1839 Holland acceded to a treaty, by which Belgium surrendered to her portions of Limburg and Luxemburg, which she had retained since 1830.

During the reign of Leopold, a prosperous period of 34 years, Belgium became a united and patriotic community. Arts and commerce flourished, and a place was taken in the family of nations upon which the Belgian people could look with complacency. On the outbreak of the French revolution of 1848 Leopold declared his willingness to resign the crown if it was contrary to the wishes of his subjects that he should retain it. This declaration disarmed the Republican party, and confirmed the stability of the monarchy at a critical moment. During his reign Belgium concluded various treaties of commerce, with Great Britain in 1851 and 1862, and with France in 1861. Leopold II. succeeded his father in 1865. In recent years the chief feature of Belgian politics has been a keen struggle between the clerical and the liberal party. At the elections in June 1878, the liberals gained a majority, which they lost in 1884, and failed to regain in 1890. Soon after followed a revision of the constitution, and at the elections in 1894 the clericals were returned with a great majority over liberals and socialists combined. In 1885 Leopold II. became sovereign of the Congo Free State (q.v.).

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Belgorod, byēl' gō-rōt, or **Bielgorod**, a town in Russia, government of, and 76 miles south from the town of Kursk, on the Donetz. It is the seat of an archbishop's see, and has important fairs.

Belgrade, the capital of the kingdom of Servia, situated in the angle formed by the junction of the Save with the Danube, overlooked by a citadel on a rocky eminence about 160 feet high. The town has been almost entirely transformed in recent times, and now contains a number of fine buildings and wide streets, being provided with the electric light, tramways, telephones, waterworks, etc., and having generally the aspect of any modern European town. It contains the royal palace, residences of various ambassadors or ministers, the chief courts and government departments, archiepiscopal cathedral, Protestant church and school, high school or college, gymnasias, military school, national library of 80,000 volumes, national museum, etc. The most numerous places of worship are the

Greek-Catholic. There are no industries of any importance, but trade, however, is active, Belgrade being the chief emporium of the kingdom, the place to which most of the imports and exports of Servia are brought, and through which a large transit trade passes between Austria and Turkey. It is now connected by railway with Budapest and with Constantinople and Salonica, and carries on a large shipping trade by the Danube, and also the Save. Under the name of Singidunum, Belgrade was the station of a Roman legion, and in later years was several times destroyed in the contests of the Byzantines, Bulgarians, and Hungarians. Being the key of Hungary, it was long an object of fierce contention between the Austrians and the Turks. It was taken by the latter in 1521 and held by them till 1688, when it was retaken by the imperial army. Two years afterward it was again captured by the Turks, who perpetrated every sort of atrocity in the conquered city, besides killing 1,200 of the garrison. From this period it remained in possession of the Turks till 1717, when it was besieged by Prince Eugene. After a desperate conflict between the contending armies the Turks were defeated. In 1739 the Turks came into possession of it by treaty, retaining it till 1789, when it was taken by the Austrians. It was restored by treaty to the Turks in 1791; since which time it has shared the varying fortunes of Servia. In consequence of a quarrel with the Servians it was bombarded by the Turkish garrison in 1862. In 1867 it was evacuated by the Turks altogether, and since the Treaty of Berlin (July 1878) has been the capital of an independent state. An American consul resides here. See SERVIA. Pop. about 79,000.

Belgrand, bēl-grān, **Marie François Eugene**, French civil engineer: b. Ervy, 23 April 1810; d. 8 April 1878. He designed the gigantic sewerage system and water supply system of Paris, and published 'La Seine'; 'Les Tranvaux Souterrains de Paris'; 'Les eaux Anciennes de Paris'; etc.

Belgravia, the name given to the fashionable quarter of London south and west of Belgrave Square. Till the early part of the 19th century the district was a marshy farm. The district was drained and filled in about 1825.

Belial, bē'li-āl or bē'yāl. By the translators of the English Bible, this word is often treated as a proper name, as in the expressions, "son of Belial," "man of Belial." In the Old Testament, however, it ought not to be taken as a proper name, but it should be translated "wickedness," or "worthlessness." To the later Jews Belial seems to have become what Plato was to the Greeks, the name of the ruler of the infernal regions; and in 2 Cor. vi. 15 it seems to be used as a name of Satan, as the personification of all that is bad.

Belief. In a general sense belief is the assent of the understanding to the truth of a proposition, but in a technical and theological sense, has come to be used as a mental exercise somewhat depending upon the volition of the individual. The word is used to mean the acceptance of a proposition, statement, or fact as true on the ground of evidence, authority, or irresistible mental predisposition; the state of trust in and reliance on a person, thing, or principle; as also for the fact believed, and some-

times specifically for the Apostles' Creed. Belief is by some distinguished from knowledge, inasmuch as the latter rests on evidence, while belief rests on authority. Belief should, some say, not be used of facts occurring in one's own experience, or principles of which the opposite implies absurdity, such as the axioms of geometry. These we know, and, according to this view, the term should be limited to cases where a proposition is accepted without evidence, or where such evidence as is available implies only probability. On the other hand, the psychologists of what is called the intuitive school are accustomed to regard as beliefs the fundamental data on which reasoning rests; and to say that all knowledge rests ultimately on belief. Belief, they say, may admit of all degrees of confidence, from a slight suspicion to full assurance. There are many operations of mind in which it is an ingredient—consciousness, remembrance, perception. Kant defined opinion as a judgment which is insufficiently based, subjectively as well as objectively; belief, as subjectively sufficient but objectively inadequate; knowledge, as both subjectively and objectively sufficient. The strongest beliefs may, of course, be false; beliefs in ghosts, astrological prognostications, etc., are usually treated as superstitions. Beliefs as such rest on grounds regarded as sufficient by the person believing, who is prepared to act on his belief; but their grounds may have absolutely no validity for any other person. Such beliefs are nevertheless very real. On the other hand there are many propositions accepted traditionally, and spoken of as beliefs, which are not real, vital abiding truths for those who nominally accept them; which have no influence on character or mental tone, and on which those who hold them would not be prepared to act. Faith is a word used in very much the same sense as belief, but especially signifies the acceptance of and reliance on the truths of religion.

Bibliography.—Newman, 'Grammar of Assent'; Bain, 'The Emotions and the Will' (1800); Spencer, 'Psychology' (1881); Mill, 'Analysis of the Phenomena of the Human Mind' (1869); James, 'Psychology' (1890); Brentano, 'Psychologie' (1874); Verbrout, 'Die Psychologie des Glaubens'; Balfour, 'The Foundations of Belief'; Hume, 'Inquiry' (1894); Ward, 'The Wish to Believe' (1884).

Belinda, a novel by Maria Edgeworth. Belinda Portman goes to spend the winter in London with Lady Delacour, a brilliant and fashionable woman; at her house she meets Clarence Hervey for the first time. Various obstacles keep the lovers apart, but the story ends happily with the marriage of Hervey and Belinda.

Belisarius, famous Byzantine general: b. about 505; d. 565. To him the Emperor Justinian chiefly owed the splendor of his reign. Belisarius first served in the bodyguard of the emperor, soon after obtained the chief command of an army of 25,000 men stationed on the Persian frontiers, and in the year 530 gained a complete victory over a Persian army of not less than 40,000 soldiers. The next year, however, he lost a battle against the same enemy, who had forced his way into Syria—the only battle which he lost during his whole career. He was recalled from the army, and soon became at home the

support of his master. In the year 532 civil commotions, proceeding from two rival parties, who called themselves the green and the blue, and who caused great disorders in Constantinople, brought the life and reign of Justinian into the utmost peril, and Hypatius was already chosen emperor, when Belisarius with a small body of faithful adherents restored order. Justinian, with a view of conquering the dominions of Gelimer, king of the Vandals, sent Belisarius with an army of 15,000 men to Africa. After two victories he secured the person and treasures of the Vandal king. Gelimer was led in triumph through the streets of Constantinople, and Justinian ordered a medal to be struck with the inscription *Belisarius gloria Romanorum*, which has descended to our times. By the dissensions existing in the royal family of the Ostrogoths in Italy, Justinian was induced to attempt to bring Italy and Rome under his sceptre. Belisarius vanquished Vitiges, king of the Goths, made him prisoner at Ravenna (540), and conducted him, together with many other Goths, to Constantinople. The war in Italy against the Goths continued; but Belisarius, not being sufficiently supplied with money and troops by the emperor, demanded his recall (548). He afterward commanded in the war against the Bulgarians, whom he conquered in the year 559. Upon his return to Constantinople he was accused of having taken part in a conspiracy. But Justinian was convinced of his innocence, and is said to have restored to him his property and dignities, of which he had been deprived. His history has been much colored by the poets, and particularly by Marmontel, in his otherwise admirable politico-philosophical romance. According to his narrative, the emperor caused the eyes of the hero to be struck out, and Belisarius was compelled to beg his bread in the streets of Constantinople. Other writers say that Justinian had him thrown into a prison, which is still shown under the appellation of the Tower of Belisarius. From this tower he is reported to have let down a bag fastened to a rope, and to have addressed the passengers in these words: "Give an obolus to Belisarius, whom virtue exalted, and envy has oppressed." Of this, however, no contemporary writer makes any mention. The blind Belisarius forms the subject of a noted painting by Gérard. Tzetzes, a slightly esteemed writer of the 12th century, was the first who related this fable. Certain it is, that, through too great indulgence toward his wife, Antonina, Belisarius was impelled to many acts of injustice, and that he evinced a servile submissiveness to the detestable Theodora, the wife of Justinian. See Hodgkin, 'Italy and her Invaders' (1880-5); Bury, 'Later Roman Empire' (1893).

Belize, bē-lēz' (sometimes written BELICE or BALIZE), the capital of British Honduras. Lat. 17° 29' N.; lon. 88° 8' W. It has been suggested that the name is derived from the French *balise*, a beacon, but more probably it is a corruption of Wallace, a Scotch buccaneer named Peter Wallace, with 80 companions, having erected houses enclosed with a rude palisade at this point after the Spaniards abandoned Bacala, leaving a large part of the rugged, uninviting north coast of the Gulf of Honduras unoccupied, save by freebooters, during the latter half of the 17th century. Accordingly the name *Walis*, *Balis*, or *Belize* was applied by the

natives and Spaniards to the settlement, the river on which it was situated, and subsequently to the whole region occupied by the English (see Bancroft's 'History of Central America,' II., 624). Wood-cutting was the chief occupation of this piratical establishment. The value of the forests attracting other settlers, Belize was attacked by the authorities of Yucatan, who sought to expel them as trespassers, in 1733. Various unsuccessful attempts with the same object were made in subsequent years, the most formidable in 1754. Again in 1779, war existing between England and Spain, the governor of Yucatan organized an expedition against Belize; and Spain's last effort to regain possession by force was made in 1798. Before that time the settlers had organized a government. It is an interesting fact that, originating as it did, the town has become, with its population of more than 5,000, its church, schools, and hospital, a centre for the maintenance of good order. It has the characteristic features of a small English colonial capital,—the governor's house, etc. See HONDURAS, BRITISH. MARRION WILCOX,

Authority on Latin-America.

Belknap, George Eugene, American naval officer: b. Newport, N. H., 22 Jan. 1832; d. Key West, Fla., 7 April 1903. He was appointed midshipman in the navy in 1852; became lieutenant-commander in 1862; commander in 1866; captain in 1872; commodore in 1885; and rear-admiral in 1889; and was retired in 1894. He took part in the capture of the Barrier Forts on the Canton River, China, in 1856; and in the Civil War was present at the bombardment of the forts and batteries in Charleston Harbor, and in both of the attacks on Fort Fisher. In 1873, while engaged in deep sea sounding in the north Pacific Ocean, he made discoveries concerning the topography of the bed of the ocean that found high favor among scientists. He was appointed superintendent of the United States Naval Observatory in 1885, and, among other works, published 'Deep Sea Soundings.'

Belknap, Jeremy, American clergyman: b. Boston, Mass., 4 June 1744; d. there, 20 June 1798. He graduated at Harvard in 1762; was pastor of the Congregational Church in Dover, N. H., 1767-86, and of the Federal Street Church, in Boston, 1787-98; and was active for the American cause during the Revolution. The Massachusetts Historical Society, organized in 1790, recognizes him as its founder. In 1792 he became an overseer of Harvard College. He was the author of a 'History of New Hampshire' (1784-92); 'A Discourse Intended to Commemorate the Discovery of America by Columbus, with Four Dissertations' (1792); 'An Historical Account of Those Persons Who Have Been Distinguished in America,' generally known as the 'American Biography,' etc.

Belknap, William Goldsmith, American military officer: b. Newburg, N. Y., 14 Nov. 1794; d. near Fort Washita, 16 Nov. 1852. He distinguished himself in the attack on Fort Erie, in August 1814; was retained in service on the reduction of the army, in 1822, having been, in 1818, one of the assistant professors of tactics in the military academy. He became a captain in 1822, and was brevetted for faithful service, 10 years afterward. In 1842 he was appointed major of the 3d infantry, and, having served in Florida during the war, was made lieutenant-

colonel by brevet. He served on the general staff at Buena Vista, and received a sword of honor from the citizens of his own State, for his services in that battle. He also received the brevet of brigadier-general. From December 1843 to May 1851 he was in command of his regiment, and of the troops in the Cherokee nation (Arkansas). In May 1851 he was ordered to upper Texas for the purpose of keeping the Indian tribes within the lines, and while there contracted a fever, of which he died.

Belknap, William Worth, American military officer, son of Gen. W. G. Belknap: b. Newburg, N. Y., 22 Sept. 1829; d. Washington, D. C., 13 Oct. 1890. In 1861 he entered the Union army as major of the 15th Iowa Volunteers and was engaged at Shiloh, Corinth, and Vicksburg; but became most prominent in Sherman's Atlanta campaign. He was promoted to brigadier-general, 30 July 1864, and major-general, 13 March 1865. He was collector of internal revenue in Iowa from 1865 to 13 Oct. 1869, when he was appointed secretary of war, which office he occupied till 7 March 1876. He resigned in consequence of accusations of official corruption. Subsequently he was tried and acquitted.

Bell, A. See BELL, NANCY R. E. M.

Bell, Acton. See BRONTE, ANNE.

Bell, Alexander Graham, American scientist, inventor of the telephone: b. Edinburgh, Scotland, 3 March 1847. He was a son of Alexander M. Bell (q.v.), and was educated at the Edinburgh high school and university, and trained by his father in the latter's system for restoring speech to deaf-mutes. In 1870 he removed with his father to Canada, and in 1872 came to Boston as professor of vocal physiology in Boston University, where he taught his father's system with success. He had long been experimenting on the electrical transmission of sound, had designed and partly constructed a speaking telephone while in Canada, and on 14 Feb. 1876 took out a patent for it. At the Centennial Exposition in Philadelphia that year he exhibited it to multitudes, including foreign scientists, who applauded it warmly; it was still crude, but a company was formed to float it, inventive genius was turned toward perfecting it, and it rapidly assumed a practical commercial form. A number of other telephones were almost immediately brought forward, with claim to priority of invention, and years of protracted and costly law suits followed; but the Bell Company finally established its right before the United States Supreme Court, has held a virtual monopoly of the business in this country, and has made its owners and Prof. Bell very wealthy. In 1880 he invented the photophone, a telephone in which the sound is conveyed by a vibratory beam of light instead of a wire; it has transmitted articulate sounds about 700 feet, but has not been practically used. He has also invented the graphophone, a form of the phonograph for recording and reproducing speech, which is coming largely into use for the teaching of languages. He has never abandoned his first field, however, the instruction and advancement of deaf-mutes, has investigated and written much on this subject, and published his papers through the Volta Bureau, which he founded; and has been president of the American Association to Promote Teaching of Speech



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ALEXANDER GRAHAM BELL.

to the Deaf. He has especially urged that the policy of educating deaf-mutes in asylums is pernicious, as forcing them to intermarry, and increasing the births of children so afflicted. He has been president of the National Geographic Society, and regent of the Smithsonian Institution. The French government in 1881 awarded him the Volta prize. Among his monographs are a 'Mémorial on the Formation of a Deaf Variety of the Human Race.'

Bell, Alexander Melville, Scottish-American educator: b. Edinburgh, 1 March 1819; d. Washington, D. C., 7 Aug. 1905. He was a distinguished teacher of elocution in his native city; in 1865 removed to London to act as a lecturer in University College; and in 1870 went to Canada and became connected with Queen's College, Kingston. He invented the system of 'visible speech,' in which all the possible articulations of the human voice have corresponding characters designed to represent the respective positions of the vocal organs. This system has been successfully employed in teaching the deaf and dumb to speak. Besides writing on this subject he wrote on elocution, stenography, etc.

Bell, Andrew, Scottish educator, author of the mutual instruction or 'Madras' system of education: b. St. Andrews, 27 March 1753; d. Cheltenham, England, 27 Jan. 1832. He was educated at the university of his native town, resided for seven years in Virginia, and on returning took orders in the Church of England. In 1787 he went to India, where he became manager of the institution for the education of the orphan children of European soldiers at Madras established by the East India Company. The superintendence of this asylum was undertaken by Dr. Bell, who, having no object in view but the gratification of his benevolence, refused the salary of 1,200 pagodas (£480) which was attached to it. Failing to retain the services of properly qualified ushers, he resorted to the expedient of conducting his school through the medium of the scholars themselves. It was in the mode of conducting a school by means of mutual instruction that the new method of Dr. Bell consisted; and its value as an abbreviation of the mechanical part of teaching, and where large numbers were to be taught economically, could not be easily overestimated at the time. His system, however, is now abandoned. From the commencement of his experiment he made the scholars, as far as possible, do everything for themselves; they ruled their own paper, made their own pens, etc., while the teacher only directed them. The maxim of the school was that no boy could do anything right the first time, but he must learn when he first set about it, by means of his teacher, so as to be able to do it himself ever afterward. After superintending the school for seven years he found it necessary for his health to return to Europe. On his arrival he published in 1797 a pamphlet, entitled 'An Experiment in Education made at the Male Asylum of Madras, in which he gave an account of his system. The first place in England where the system was adopted was the charity school of St. Botolph's, Aldgate, and gradually, especially through the influence of Joseph Lancaster, it was widely carried out in England, and indeed in almost every other civilized country. Dr. Bell acquired in later life the dignity of a pre-

bendary of Westminster, and was master of Sherborn Hospital, Durham. He employed himself during his latter years in writing several works on education, among which the most valuable were: 'The Elements of Tuition'; 'The English School'; and 'Brief Manual of Mutual Instruction and Discipline.' Before his death he gave over to trustees £120,000 three per cent stock for education, half of it for the purpose of founding an academy in his native city. See 'Life by Southey' (1844); Meiklejohn, 'An Old Educational Reformer' (1881).

Bell, Andrew James, Canadian educator: b. Ottawa, 12 May 1856. He was educated at the University of Toronto, and at Breslau University; became professor of Latin and literature in Victoria University in 1889. He is an active member of the Canadian Institute, and has contributed some important papers to its 'Transactions.'

Bell, Benjamin Taylor A., Scotch-Canadian mining expert: b. Edinburgh, 2 July 1863. He went to Canada in 1882, and became editor of the 'Canada Mining Review,' and of the 'Canada Mining, Iron, and Steel Manual.' In 1890 he was appointed by the Dominion government, with Dr. Selwyn, to conduct the excursions through the mining and industrial centres of Canada of the Iron and Steel Institute of Great Britain, and the Verein Deutscher Eisenhüttenleute. The same year he organized the General Mining Association of the Province, and in 1892 was instrumental in uniting the coal, gold, and other mineral interests of Nova Scotia into a like organization.

Bell, Sir Charles, Scottish anatomist: b. Edinburgh, November 1774; d. near Worcester, England, 28 April 1842. He studied anatomy under his brother, John Bell (q.v.), and had scarcely reached manhood before he had proved himself to be a first-rate anatomist as well as an excellent lecturer. In 1804, being already known by his published works, he went to London, and in 1811 published an essay entitled 'A New Idea of the Anatomy of the Brain,' containing the important discovery of the distinction between sensory and motor nerves, on which his fame chiefly rests. It at once attracted general attention, established his reputation, and was doubtless the main ground on which, on the accession of William IV., he was selected for the honor of knighthood. In 1812 he was appointed surgeon to the Middlesex Hospital, to whose prosperity he afterward greatly contributed. In 1824 he accepted the chair of anatomy and surgery to the London College of Surgeons, and in 1836 that of surgery in the University of Edinburgh. His principal works are 'Anatomy of Expression' (1806); 'System of Operative Surgery'; 'Anatomy and Physiology,' with his brother John; 'Animal Mechanics' (1828); 'Nervous System' (1830); and the Bridge-water Treatise on the Hand' (1833). There is a life in French by Pichot (1859), and in 1870 a selection from Sir Charles Bell's correspondence was published.

Bell, Currer. See BRONTE, CHARLOTTE

Bell, Ellis. See BRONTE, EMILY JANE

Bell, George Joseph, Scottish lawyer, brother of Sir Charles and John Bell: b. Edinburgh, 26 March 1770; d. 1843. He passed as advocate in 1791, and became one of the first

authorities on the subject of mercantile jurisprudence and the law of bankruptcy. This distinction he earned for himself by the publication of a work which first appeared in 1804, under the title of a 'Treatise on the Laws of Bankruptcy,' but in subsequent editions was extended and appeared as 'Commentaries on the Laws of Scotland and on the Principles of Mercantile Jurisprudence.' This work, notwithstanding recent changes in the law, is still a standard. Besides the work above mentioned, he published 'Principles of the Law of Scotland,' the 10th edition of which was issued in 1897; and other works.

Bell, Henry, Scottish engineer, the first successful applier of steam to the purposes of navigation in Europe: b. Torphichen, Linlithgowshire, 7 April 1767; d. Helensburgh, 14 Nov. 1830. He practised for several years, at Glasgow, the craft of a house carpenter, but in 1808 removed to Helensburgh, where he continued to prosecute his favorite task of mechanical scheming, without much regard to the ordinary affairs of the world, though he became proprietor of baths there. The application of steam to navigation had already been attempted by Mr. Miller of Dalswinton (among others), who, in 1788, had a vessel constructed, propelled by a small engine and paddle-wheel, the scene of operations being a loch on his own property in Dumfriesshire. Some further experiments were made, yet the scheme had no practical result for several years. Henry Bell seems to have turned his attention to the subject before the end of the century, and in January 1812 produced the *Comet*, a vessel 40 feet long, which was found in a great measure to answer the purpose contemplated. This vessel could make way against a head tide in the river at the rate of five miles an hour, and continued to ply on the Clyde for a number of years. It may be mentioned, that Mr. Robert Fulton, an American engineer, had launched a boat upon this principle in 1807, and that it performed long voyages upon the Hudson River; but it has been proved that Fulton had derived assistance in the construction of his vessel from Bell, who must therefore be allowed the praise of having done, in his own country, what all other men, notwithstanding the superior advantages of skill and capital, had failed in doing. Bell lived to see the bosom of the Clyde dotted far and wide by innumerable copies of his own invention; to know that steamboats promised to give a new turn to the art of general warfare; yet he reaped for himself little advantage. While mankind at large were enjoying the blessings which he had pointed out to them, he approached the confines of old age with the prospect of hardly the average comforts which attended that stage of existence in the humbler walks of society. Touched by his condition, a number of benevolent individuals instituted a subscription in his behalf, and it is creditable to the good feeling of the citizens of Glasgow and other places that a considerable sum was raised. The trustees on the river Clyde also gave him an annuity of £100, which he enjoyed for several years, the half of which sum was continued to his widow. A monument was erected to his memory at Douglass Point on the Clyde.

Bell, Henry Glassford, Scottish lawyer and author: b. Glasgow, 1803; d. 1874. He

founded the Edinburgh 'Literary Journal' 1828. was admitted to the bar in 1832 and became one of the most esteemed Scottish mercantile lawyers of his day. He published a spirited defense of Mary Queen of Scots, (1830), 'Summer and Winter Hours' (1831); 'My Old Portfolio' (1832); 'Romances and Minor Poems' (1866).

Bell, Henry Haywood, American naval officer: b. North Carolina, 1807; d. 11 Jan. 1868. He was appointed a midshipman in 1823, and served on the *Grampus* when she was engaged in clearing the coast of Cuba of pirates. For many years he served with the East Indian squadron, and commanded one of the vessels of the squadron which, in November 1856 destroyed four forts near Canton, China. Shortly after the outbreak of the Civil War he became fleet captain of the Western Gulf squadron. He commanded one of the three divisions of the fleet which captured New Orleans, and was sent to raise the United States flag over the custom house and the city hall. In 1865 he took command of the East India squadron with the rank of commodore; in 1866 was promoted to rear-admiral; and, in 1867, retired. He was drowned at the mouth of the Osaka River, Japan.

Bell, Henry Thomas Mackenzie, English poet and critic: b. Liverpool, 2 March 1852. His collections of verse include 'The Keeping of the Vow' (1879); 'Verses of Varied Life' (1882); 'Old Year Leaves' (1883); 'Spring's Immortality' (1896); 'Pictures of Travel' (1898). He has also published such critical works as 'Charles Whitehead' (1884); 'Christina Rossetti' (1898).

Bell, Hillary, American dramatic critic: b. Belfast, Ireland, 1857; d. New York, 9 April 1903. After coming to the United States he painted portraits for some years and subsequently engaged in journalism and was the dramatic and musical critic of the *New York Press*. He also edited the 'Insurance Economist,' and was a vice-president of the Mutual Reserve Life Insurance Company. The life-size portrait which he painted of Ada Rehan as Katharine in 'The Taming of the Shrew,' was presented by Augustin Daly to the Shakespeare Memorial at Stratford-on-Avon.

Bell, Isaac, American philanthropist: b. New York, 4 Aug. 1814; d. there, 30 Sept. 1897. He began his business life in a banking house when 14 years old, and in 1836 became interested in large financial and other concerns. About this time he began to devote himself to the work of benevolent institutions, and was president of the department of charities and correction 1857-73. It was principally through his efforts that the Bellevue Hospital, and also the Bellevue Hospital Medical College, were founded. In connection with the first institution he established the system of ambulance service. He was also largely instrumental in the establishment of the Normal College, and was responsible for the schoolship *Mercury*, which came under the control of the department of Charities and Correction, and of the St. Mary's, as well, loaned by the Navy Department to the Department of Education, of which he was also for a long time a member. During the Civil War he was active in raising and disbursing money for the benefit of New York volunteers.

and in aiding soldiers' wives, widows, and orphans.

Bell, James, Scotch geographer: b. Jedburgh, 1769; d. 1833. After receiving a liberal education he served an apprenticeship to the weaving business, and in 1790 commenced the manufacturing of cotton goods upon a large and respectable scale. In the universal depression occasioned by the shock of the French Revolution in 1793, he was reduced to the condition of a common warper; but having relinquished that line of life, he was about the year 1815 engaged to improve the 'Glasgow System of Geography,' a work which had met with considerable encouragement, and was now, chiefly by the labors of Mr. Bell, extended to five volumes. It was well received by the public, and formed the basis of his principal work, 'A System of Popular and Scientific Geography,' published at Glasgow in six volumes. His 'Gazetteer of England and Wales' was in the course of publication at the time of his death.

Bell, James, Canadian physician: b. North Gower, Ont., 10 Oct. 1852. He graduated at McGill University in 1877; became house surgeon of the Montreal General Hospital the same year, and medical superintendent of it in 1881. In 1885 he became a member of the hospital staff as assistant surgeon, and in 1886 full surgeon. In 1894 he was made consulting surgeon to the General Hospital, surgeon of the Royal Victoria Hospital of Montreal, and professor of clinical surgery in McGill University.

Bell, James Franklin, American soldier: b. Shelbyville, Ky., 9 Jan. 1856. He was graduated from the United States Military Academy 1878; served on the plains in the 7th United States Cavalry, 1878-94; and was aid to Gen. J. W. Forsyth in California, Arizona, and Washington. He went to the Philippines with the original expedition in 1898, and his military career there has been of the most daring and brilliant kind. As colonel of the 36th regiment of volunteers, he was not attached to any brigade, but acted as a free lance, reporting only to his division commander. He received a medal of honor for most distinguished gallantry in action 9 Sept. 1899, near Porac, in Luzon. While in advance of his regiment he charged seven insurgents with his pistol and compelled the surrender of the captain and two privates under a close and hot fire from the remaining insurgents, who were concealed in a bamboo thicket. In December 1900 he was made a brigadier-general in the regular army, being promoted over more than 500 captains, 200 majors, 98 lieutenant-colonels, and 77 colonels.

Bell, James Montgomery, American soldier: b. Williamsburg, Pa., 1 Oct. 1837. He entered the 86th Ohio infantry, and served with distinction throughout the Civil War, being twice brevetted for gallant and meritorious services in the battles of the Wilderness and Ream's Station, Va. Entering the regular army as 2nd lieutenant in 7th Cavalry, 1866, he took part in the Cheyenne and Arapahoe war, 1867-9; the Sioux wars, 1876-81, and the Nez Percés war, 1877. He received a brevet-commission of lieutenant-colonel for gallant services in action against the Indians at Cañon Creek, Montana, 13 Sept. 1877. He commanded in

southern Luzon, Philippine Islands, 1900-1, and was appointed brigadier-general of volunteers, Jan. 20, 1900.

Bell, John, Scotch traveler: b. Antermomy, 1691; d. there, 1 July 1780. Having gone to St. Petersburg in 1714, after the completion of his studies, he happened to be in that city when an embassy was being sent to the Sophy of Persia, and was appointed medical attendant to the ambassador. On his return from Persia to the Russian capital in 1718 he found another embassy preparing to set out for China, and through the influence of the ambassador whom he had attended to Persia he obtained an appointment in it also. The embassy arrived at Pekin "after a tedious journey of exactly 16 months." The embassy returned in January 1722. The war between Russia and Sweden was now concluded, and the czar had determined to undertake an expedition into Persia, at the request of the sophy, to assist that prince against the Afghans, his subjects, who had seized upon Kandahar and possessed themselves of several provinces on the frontiers toward India. Bell's former journey to Persia gave him peculiar advantages, and he was accordingly engaged to accompany the army to Derbend, from which he returned in December 1722. In 1737 he was sent to Constantinople by the Russian chancellor, and Mr. Rondeau, the British minister at the Russian court. He seems now to have abandoned the public service, and to have settled at Constantinople as a merchant. About 1746 he married a Russian lady and returned to Scotland. The only work written by him is his 'Travels from St. Petersburg in Russia to Various Parts of Asia' (1763).

Bell, John, distinguished Scotch surgeon: b. Edinburgh, 12 May 1763; d. Rome, 15 April 1820. He was a brother of Sir Charles and George Joseph Bell, and after completing his professional education traveled for a short time in Russia and the north of Europe; and on his return began to deliver lectures on surgery and midwifery. These lectures, delivered between 1786 and 1796, were very highly esteemed, and speedily brought him into practice as a consulting and operating surgeon. The increase of his private practice, indeed, rendered it necessary for him, in 1796, to discontinue his lectures, and from that time forward he devoted himself to his patients, and to the preparation of the several publications of which he was the author. Patients came to him from all quarters, both of Scotland and England, and even from the Continent; and during that interval he performed some of the most delicate and difficult operations in surgery. Early in 1816 he was thrown by a spirited horse, and appears never to have entirely recovered from the effects of the accident. He was the author of 'The Anatomy of the Human Body' (1793-1802; 3d edition, with plates by Charles Bell, 1811); 'Engravings of the Bones, Muscles, and Joints,' illustrating the first volume of the 'Anatomy of the Human Body,' drawn and engraved by himself (1794, 3d edition); 'Engravings of the Arteries,' illustrating the second volume of the 'Anatomy of the Human Body' (1801); 'Discourses on the Nature and Cure of Wounds' (1795); 'The Principles of Surgery' (1801-8); 'Letters on Professional Character'; 'Observations on Italy.'

Bell, John, American statesman: b. near Nashville, Tenn., 15 Feb. 1797; d. Cumberland Iron Works, Tenn., 10 Sept. 1869. Graduating at Cumberland College (now University of Nashville) in 1814, he practised law until 1827, when he was elected to Congress. He received successive re-elections until 1841 when he became secretary of war in President Harrison's cabinet, but resigned when President Tyler withdrew from the Whig party. From 1847 to 1859 he was senator from his State. He was chairman of several important committees, and vigorously opposed the Kansas-Nebraska bill and the Lecompton constitution framed for Kansas. In May 1860 he was nominated for President by the Constitutional Union party (q.v.), but was defeated. During the Civil War he took no active part in politics.

Bell, John, English sculptor: b. Hopton, Suffolk, 1811; d. 25 March 1895. His best-known works are the 'Eagle Slayer'; 'Una and the Lion'; 'The Maid of Saragossa'; 'Imogen'; 'Andromeda'; statues of Lord Falkland, Sir Robert Walpole, Newton, Cromwell, etc., and the Wellington Memorial in Guildhall. He was one of the sculptors of the Guards' Monument in Waterloo Place, London, and the Prince Consort Memorial in Hyde Park. He was the author of several professional treatises and of a drama, 'Ivan: a Day and a Night in Russia.'

Bell, Lilian, American novelist: b. Kentucky, 1867. In 1900 she was married to Arthur Hoyt Boyne, but continues to write under her maiden name. Her writings include 'The Love Affairs of an Old Maid' (1893); 'A Little Sister to the Wilderness' (1895); 'The Under Side of Things' (1896); 'From a Girl's Point of View' (1897); 'The Instinct of Stepfatherhood' (1898); 'As Seen By Me' (1900); 'The Expatriates' (1900); 'Yessum' (1901); 'Abroad With the Jimmies'; 'Hope Loring'; 'Sir John and the American Girl.'

Bell, Sir Lowthian, English manufacturer and politician: b. Newcastle-on-Tyne, 1816; d. 20 Dec. 1904. He was mayor of his native city 1854-62, sat in the House of Commons for Hartlepool 1875-80, and was made a baronet in 1885. He founded the Clarence Iron Works on the Tees. His publications include 'The Chemical Phenomena of Iron Smelting' (1872); 'Report on the Iron Manufacture of the United States, and a Comparison of It with That of Great Britain' (1877).

Bell, Nancy R. E. Meugens, English art writer: b. Lambeth, London. Until her marriage to A. G. Bell in 1882 she wrote over the signature N. D. ANVERS. She has published 'Elementary History of Art'; 'Masterpieces of the Great Artists'; 'Life of Gainsborough'; 'Representative Painters of the 19th Century'; 'St. Antony of Padua'; 'An Old Educational Reformer: J. M. D. Meiklejohn'; 'Memoirs of Baron Le Jeune'; 'Science Ladders Series' (8 vols.); 'Raphæl'; 'Lives and Legends of the Saints'; 'The Saints in Christian Art.'

Bell, Robert, Irish journalist and miscellaneous writer: b. Cork, 16 Jan. 1800; d. London, 12 April 1867. He settled in London in 1828, edited an important weekly paper, the *Atlas*, for several years, and afterward the 'Monthly Chronicle,' 'Mirror,' and 'Home News.' He compiled several volumes of 'Lard-

ner's Cabinet Cyclopædia'; wrote three plays, 'The Ladder of Gold,' a novel (1856); 'Hearts and Altar,' a collection of tales (1852), and did a great deal of miscellaneous literary work; but is best known by his annotated edition of the 'British Poets,' the first volume of which appeared in 1854, and which was carried through 29 volumes.

Bell, Robert, Canadian geologist: b. Toronto, Ont., 3 June 1841. He was educated at McGill and Queen's universities, and in 1867 joined the Canada Geological Survey, and in 1900 was an assistant director of it. In 1861 he was elected a member of the American Institute of Mining Engineers; in 1881 became a Fellow of the Royal Society of Canada; and in 1888-9 was a member of the Ontario Commission, which reported on the mineral resources of that province. During his connection with the geological survey, he made more extensive explorations throughout the Dominion than any other man. He was the author of about 130 reports and papers, a list of which is found in the 'Biblio of the Royal Society.'

Bell, Robert Stanley Warren, English writer, editor of 'The Captain': b. Long-Preston, Yorkshire, 27 June 1871. He has published 'The Cub in Love' (1897); 'The Papa Papers' (1898); 'Bachelorland' (1899); 'Tales of Greyhouse'; 'Love the Laggard' (1901).

Bell, Samuel, American statesman: b. Londonderry, N. H., 9 Feb. 1770; d. Chester, N. H., 23 Dec. 1850. He passed his boyhood upon his father's farm, graduated at Dartmouth College in 1793, and was admitted to practise law in 1796. He rapidly achieved distinction in his profession, and in 1804 was elected a representative to the State legislature, an office to which he was twice re-elected; and during his last two terms held the position of speaker of the house. He declined the attorney-generalship in 1807, after which he was successively a member of the State senate, and of the executive council, a judge of the supreme court, and in 1819 governor of the State. To the latter office he was re-elected four times in succession, till in 1823 he was elected to the senate of the United States, an office to which he was also re-elected. He retired from public life upon the expiration of his second term in 1835.

Bell, Samuel Dana, American jurist: b. Francess town, N. H., 9 Oct. 1798; d. 31 July 1868. He was graduated at Harvard in 1816; studied law in Exeter; and began practice in Meredith. He became a member of the legislature about 1825, and was the clerk of that body for several years. In 1830, 1842, and 1867, he was a member of the commissions appointed to revise the State 'Statutes.' In 1855 he was appointed justice of the supreme court of New Hampshire, and in 1859, became chief justice of the court, which office he held till 1864. He joined the New Hampshire Historical Society soon after its organization, and the Manchester Public Library was founded largely through his efforts.

Bell, Thomas, English zoologist: b. Poole, Dorset, 1792; d. Selborne, Hampshire, 1880. He studied medicine at Guy's and St. Thomas' hospitals, London, became a member of the Royal College of Surgeons in 1815, and soon secured a large practice as a dentist. In 1832 he was appointed professor of zoology in King's

College, London, a post which he held almost to the last. Latterly he lived for a number of years at Selborne in the residence that had belonged to the celebrated Gilbert White. His best-known separate works are his histories of 'British Quadrupeds'; 'British Reptiles'; and 'British Stalk-eyed Crustacea,' published in Van Voorst's series. In 1877 he published an excellent edition of White's 'Natural History of Selborne.'

Bell-Smith, Frederic Marlett, English artist: b. London, 26 Sept. 1846. He went to Canada in 1866, and was for seven years art director at Alma College, St. Thomas, and teacher of drawing in the public schools of London, Ont. About 1888 he became a portrait and figure painter; but he is best known as a painter of landscapes. In 1894 he produced 'Lights of a City Street,' his greatest achievement up to that year, and later, two canvases depicting incidents connected with the death of Sir John Thompson.

Bell, a hollow vessel, which, by its vibrations when struck, gives forth sounds; whence its name, from the old Saxon word *bellan*, to bawl or bellow. It is an instrument of great antiquity, being spoken of by Hebrew writers, as in Ex. xxviii., in which golden bells are prescribed as appendages to the dress of the high priest, that notice may thus be given of his approach to the sanctuary. And at this day the bell is used for a similar purpose before the priest, in Roman Catholic countries, as he proceeds to administer the Holy Viaticum to the soul that is passing away; and so when the bell is tinkled, in administering the sacrament, by the same priest, it is in pursuance of a custom founded on the ancient Hebrew use of the bell. More intimately than any other instrument are bells associated with the religious and imaginative, as also with the most joyous and the saddest feelings of mankind. The metal from which bells are usually made (by founding), is an alloy, called bell-metal, commonly composed of 80 parts of copper and 20 of tin. The proportion of tin varies, however, from one third to one fifth of the weight of the copper, according to the sound required, the size of the bell, and the impulse to be given. The clearness and richness of the tone depend upon the metal used, the perfection of its casting, and also upon its shape; it having been shown by a number of experiments that the well-known shape with a thick lip is the best adapted to give a perfect sound. The depth of the tone of a bell increases in proportion to its size. A bell is divided into the body or barrel, the ear or cannon, and the clapper or tongue. The lip or sound bow is that part where the bell is struck by the clapper.

The sound of a bell is a compound tone, presenting five and in many instances more notes to the ear. There is a great difference between the harmonics of a bell and of a vibrating string. In the case of the former a minor third is not infrequently one of the loudest tones next to the fundamental tone. When a bell is properly struck the first note which attracts the attention of the ear is known as the strike note, tap note, or fundamental, and forms what is called 'the' note of the bell. The low sound heard after the strike note has lost its intensity is called the hum note, and the octave above the

strike note the nominal. There are also present a minor third and a perfect fifth in the first octave, and a major third and a perfect fifth in the second octave. Very few bells agree with these conditions. Generally the hum note is a sixth or seventh, and in rare cases a ninth below the strike note. The nominal is somewhere about an octave or a ninth above the strike note, and the other notes diverge accordingly. Bells that are swung are more likely to conform to the conditions than those that are struck.

Bells were used very early in the form of cymbals and hand bells in religious services. In Egypt the feast of Osiris was announced through the ringing of bells. Bronze bells have been found in Assyria. Bells of gold were worn by Aaron and the high priests of the Jews on the border of their robes, and in Athens the priests of Cybele used them in their offerings. The Romans also used bells which they called tintinabula, to announce the public assemblies, and, according to Suetonius, Augustus had a bell suspended before the temple of Jupiter. In the Christian churches a similar custom early came into use, though it is not known that in the first Christian churches divine service was announced by any such method. They were used, however, in the early monasteries to announce the hours of prayer. Generally they were made of tubes struck with a hammer. They are said to have been first introduced into Christian churches about 400 A.D., by Paulinus, bishop of Nola in Campania (whence campana and nola as old names of bells); although their adoption on a wide scale does not become apparent until after the year 550, when they were introduced into France. They are rung to summon monks and choir nuns to the office, and the people to mass, to announce the Angelus, to toll during funerals, and peal on occasions of joy. They are blessed with elaborate ceremonies and consecrated or "baptized" in honor of some saint.

Until the 13th century they were of comparatively small size, but after the casting of the Jacqueline of Paris (6½ tons) in 1400, their weight rapidly increased. Among the more famous bells are the bell of Cologne, 11 tons, 1448; of Dantzic, 6 tons, 1453; of Halberstadt, 7½, 1457; of Rouen, 16, 1501; of Breslau, 11, 1507; of Lucerne, 7½, 1636; of Oxford, 7½, 1680; of Paris, 12½, 1680; of Bruges, 10¼, 1680; of Vienna, 17¾, 1711; of Moscow (the monarch of all bells), 193, 1736; three other bells at Moscow, ranging from 16 to 31 tons, and a fourth of 80 tons, cast in 1819; the bell of Lincoln (Great Tom), 5½, 1834; of York Minster (Great Peter), 10¾, 1845; of Montreal, 13½, 1847; of Westminster (Big Ben), 15½, 1856; (St. Stephen), 13½, 1858; the great bell of St. Paul's, 17½, 1882. Others are the bells of Ghent (5), Görlitz (10¼), St. Peter's, Rome (8), Antwerp (7¼), Olmutz (18), Brussels (7), Novgorod (31), Pekin (53½).

Bells, as the term is used on shipboard, are the strokes of the ship's bell that proclaim the hours. Eight bells, the highest number, are rung at noon and every fourth hour afterward, that is, at 4, 8, 12 o'clock, and so on. The intermediary periods are indicated thus: 12:30, 1 bell; 1 o'clock, 2 bells; 1:30, 3 bells, etc., until the eight bells announce 4 o'clock, when the series recommences 4:30, 1 bell; 5 o'clock, 2

BELL-BIRD — BELLA

bells, etc. The even numbers of strikes thus always announce hours, the odd numbers half hours. See Gatty, 'The Bell: Its Origin and Uses' (1848); Lukis, 'Church Bells and Their Founders' (1857); Andrews, 'History of Church Bells' (1885); Otte, 'Glockenkunde' (1884); Tyack, 'A Book About Bells' (1899).

Bell-bird, the name given to birds in various parts of the world, which utter bell-like notes; especially the "campanero" (*Chasmorhynchus niveus*), one of the chatters of the South American family, *Cotingidae*. It resembles, in form and size, the North American wax-wing, but is pure white, and has a remarkable appendage upon its forehead. This consists of a fleshy, tapering caruncle, which is black, thinly covered with star-like tufts of minute feathers. This caruncle ordinarily hangs loosely down at the side of the beak, but in moments of excitement becomes swollen and much extended, reaching a length of even five inches. This seems to be produced by air forced into its elastic tissues from the bird's lungs, and occurs whenever the characteristic notes are uttered. The bird's voice has been described by many travelers as like the sound of a loud, clear bell, which rings out over the forest at mid-day, when most other birds are silent. Waterton said: "You hear his toll and then a pause for a minute, then another toll, and then a pause again, and then another toll, and so on." Others have compared the sound to a blow upon an anvil, and all agree that it can be heard a great distance. Several other species exist in central and southern South America, all of which have caruncles, and utter extraordinary, ringing notes; but the former belief, that the loud voice was aided by these hollow appendages, is now known to be erroneous. These birds go about in small flocks, which flit through the tree-tops, and feed mainly upon forest fruits. They have been particularly studied by J. J. Quelch, a naturalist of British Guiana, an account of whose interesting investigations will be found in 'The Field' of London, for 26 Nov. 1892.

In Australia, the name "bell-bird" is given to one of the honey-suckers (q.v.), whose ching-ching is welcomed by travelers in the forest as an indication that water is near. The "bell-bird" of New Zealand is another honey-sucker (*Anthornis melanura*), whose voice, usually heard in chorus, resembles the tinkling of a silver bell.

Bell, Book, and Candle, a solemn mode of excommunication, used in the Roman Catholic Church. After the sentence is read, the book is closed, a lighted candle thrown to the ground, and a bell tolled as for one dead. See also EXCOMMUNICATION.

Bell-flower. See CAMPANULA.

Bell, Liberty, the bell in Independence Hall, Philadelphia, that was rung to announce the adoption of the Declaration of Independence by the Continental Congress. The bell was cast in London by Robert Charles, and cost about \$500. The specifications provided that it was to be made by the best workmen, to be examined carefully before being shipped, and to contain, in well-shaped letters around it, the inscription: "By order of the Province of Pennsylvania, for the State House in the City of Philadelphia, 1752." An order was given to place underneath

this the prophetic words from Leviticus xxv. 10: "Proclaim liberty throughout the land and to all the inhabitants thereof." The reason for the selection of this text has been a subject of much conjecture, but the true reason is apparent when the full text is read. It is as follows: "And ye shall hallow the 50th year and proclaim liberty throughout the land and to all the inhabitants thereof." In selecting the text the Quakers had in memory the arrival of William Penn and their forefathers more than half a century before. In August 1752, the bell arrived, but though in apparent good order, it was cracked by a stroke of the clapper while being tested. It could not be sent back as the captain of the vessel who had brought it over could not take it on board. Two skilful men undertook to recast the bell, a bell being provided which pleased very much. But it was found to be defective also. The original bell was considered too high in tone, and in an attempt to correct this fault, too much copper was added. There were a great many witticisms on account of the sound failure, and the ingenious workmen undertook to recast the bell, which they successfully did, and it was placed in condition in June 1753. On Monday, 8 July (not the 4th), at noon, true to its motto, it rang out the memorable message of "Liberty throughout the land and to all the inhabitants thereof." For years the bell continued to be rung on every festival and anniversary, until it eventually cracked 8 July 1835, while being tolled in memory of Chief Justice Marshall. An ineffectual attempt was made to cause it to continue serviceable by enlarging the cause of its dissonance and chipping the edges. It was removed from its position in the tower to a lower story, and only used on occasions of public sorrow. Subsequently, it was placed on the original timbers in the vestibule of Independence Hall, and in 1873 was suspended in a prominent position immediately beneath where a larger bell, presented to the city in 1866, now proclaims the passing hours. In 1893 it was taken to Chicago and placed on exhibition at the World's Columbian Exposition.

Bell Rock, a dangerous reef of sunken rocks on the east coast of Scotland, about 12 miles from Arbroath, and directly in the way of vessels making for the firths of Forth and Tay. The Inchcape or Bell Rock reef was long the terror of seamen, and on it numerous vessels were wrecked. At a very early period the Inchcape Rock was unhappily too well known, and tradition has it that one of the Abbots of Aberbrothock succeeded in placing a bell upon it (hence the name), in such a way as to be rung by the motion of the waves, to warn sailors of its proximity. The legend tells us that a notorious Dutch sea pirate cut the bell from the rock, and on returning with his ship laden with spoils from one of his piratical expeditions, he and his crew perished, as an old historian has it, "by the righteous judgment of God," for want of the signal which he had so wantonly removed. On this legend Southey has founded his well-known ballad of 'Sir Ralph the Rover.' The lighthouse on the rock was designed by Robert Stevenson in 1800.

Bella, Stefano Della, Italian engraver: b. Florence, 1610; d. 1664. In 1642 he went to Paris, where he was employed by Cardinal

Richelieu. Returning to Florence he became the teacher in drawing of Cosmo, the son of the great duke. It is said that he engraved 1,400 plates.

Belladonna, or Dwale, Deadly Nightshade, (*Atropa Belladonna*), a perennial disagreeable-smelling herb of the natural order *Solanaceæ*; is a native of the region from southern Europe to India, but widely naturalized in civilized countries. It is a low, spreading plant which sometimes attains a height of six feet; has entire, ovate leaves; purple, bell-shaped, nodding axillary flowers, single or in pairs; and shining, black, sweetish berries as large as large currants. The plant has long been reputed poisonous but is used in medicine, especially by oculists, because of its property of dilating the pupil of the eye. It is said to derive its name, belladonna ("beautiful lady"), from its use as a cosmetic for distending the pupil and giving the eye a bright glistening appearance and also from the use of the juice for staining the skin. Its names, deadly night shade, and dwale (which latter is believed by some to come from the same source as the French *deuil*, sorrow, and by others from the Anglo-Saxon *dull*, because of its stupefying effects), refer to popular belief in the plant's poisonous properties. The generic name came from Atropos, the fate who cut the thread of life.

Belladonna Lily. See AMARYLLIDACEÆ.

Bellaire, bĕl-lār', Ohio, a city in Belmont County, on the Ohio River, and several railroads; five miles south of Wheeling, W. Va. The river is here crossed by a costly iron railroad bridge. Bellaire is the centre of a region rich in coal, iron, cement, brick, clay, and limestone, and has manufactories of stoves, glass, carriages, boilers, and foundry and machine shop products. The city has a national bank, high-grade educational institutions, daily and weekly newspapers, and an assessed property valuation of over \$3,000,000. Pop. (1910) 12,946.

Bellamont, or Bellomont, Richard Coote (EARL OF), royal governor of New York and Massachusetts: b. 1636; d. New York, 5 March 1701. To these offices he was appointed in May 1695, but did not arrive in New York until May 1698. He went from New York to Boston in May 1699, and was received by 20 companies of soldiers and a vast concourse of people. His administration was uneventful, his time having been occupied in the pursuit of the pirates who infested the coast, one of whom, the notorious Kidd, he secured and sent to England in 1700. He was disliked by the aristocratic party in New York, but very popular in New Hampshire and Massachusetts. Hutchinson speaks of Bellamont as being a hypocrite in a pretended devotion to religion. It appears, however, that while living at Fort George, in New York, he passed much time in meditation and contrition for his youthful excesses. He was accompanied to America by his countess. See De Reyster, 'Life and Administration of Richard, Earl of Bellamont' (1869).

Bellamy, Edward, American writer: b. in Chicopee Falls, Mass., 29 March 1850; d. there, 22 May 1898. He was educated in Germany; admitted to the bar; was on the staff of the *Evening Post* of New York in 1871-2; and on his return from the Sandwich Islands in 1877,

founded the *Springfield News*. He is best known by his novel 'Looking Backward' (1888), a socialistic work, of which an immense number of copies were sold in two years. This led to the formation of Nationalist clubs, in which work Mr. Bellamy took active part. His other books are 'Six to One: a Nantucket Idyl' (1878); 'Dr. Heidenhoff's Process' (1880); 'Miss Ludington's Sister' (1884); 'Equality' (1897); 'The Duke of Stockbridge' (1901), a sequel to 'Looking Backward.'

Bellamy, Elizabeth Whitfield (CROOM), American novelist, writing under the pseudonym KAMBA THORPE: b. Quincy, Fla., 17 April 1838; d. 1900. She published 'Four Oaks' (1867); 'Little Joanna' (1876); 'Old Man Gilbert' (1888); 'The Luck of the Pendenings.'

Bellamy, George Anne, English actress: b. 1727; d. 1788. She was the natural daughter of Lord Tyravley, by whom she was educated. Having forfeited his favor by going to live with her mother, she secured an engagement at Covent Garden in 1744, and appeared with Quin as Monimia in 'The Orphan.' Mrs. Bellamy's professional career was brilliant; but her extravagance and profligacy were notorious. In 1785, after many alternations of fortune, a free benefit released her from the debtors' prison, and in the same year she published an 'Apology' for her life.

Bellamy, Jacobus, Flemish poet: b. Flushing, 1757; d. 1786. In 1772 the second secular festival in commemoration of the foundation of the republic was celebrated throughout Holland. His genius, suddenly inflamed by the love of his native land, rendered him a poet, and his first productions met with success. He studied Latin, made himself better acquainted with his mother tongue, and composed several pieces of merit sufficient to induce the Society of Arts at The Hague to incorporate them in its collections. In 1785 he published his patriotic songs under the title 'Vaderlandsche Gezangen,' which secured him a place among the first poets of his nation. Bellamy sung likewise the praise of love. A biographical account of him has been written by G. Kniper.

Bellamy, Joseph, American clergyman and educator: b. North Cheshire, Conn., 20 Feb. 1719; d. 6 March 1790. In 1740 he became pastor of the church in Bethlehem, Conn., where he remained until his death. About 1742 he established a divinity school, in which many celebrated clergymen were trained. Among his published works, besides his 'Sermons,' are 'True Religion Delineated' (1750); 'The Nature and Glory of the Gospel' (1762), and 'The Half-Way Covenant' (1769).

Bellamy, Samuel, a notorious pirate, was wrecked in his ship, the *Whidah*, of 23 guns and 130 men, off Wellfleet, on Cape Cod, in April 1717, after having captured several vessels on the coast. Only one Indian and one Englishman escaped of his crew. Six of the pirates, who had been run ashore when drunk a few days previous, by the captain of the captured vessel, were hung in Boston in November 1717.

Bellangé, bĕl-lān-zhā, Hippolyte, French painter: b. Paris 1800; d. 1866. Attention was first directed to him by his painting of 'The Return of Napoleon from Elba,' exhibited in 1834. He was director of the museum at Rouen,

1837-53. Among his many noted battle pieces are 'Battle of Wagram' (1837); 'Kellerman's Charge at Marengo' (1847); 'Battle of the Alma' (1855); 'Assault on Malakoff' (1859); 'The Guard Dies' (1866).

Bellarmino, bĕl-lār-mĕnō, or **Bellarmino**, **Roberto Francesco Romolo**, Italian cardinal and celebrated controversialist: b. Monte Pulciano in Tuscany, 4 Oct. 1542; d. Rome, 17 Sept. 1621. At the age of 18 he entered the College of Jesuits, where he soon distinguished himself; and his reputation caused him to be sent into the low countries to oppose the progress of the reformers. He was ordained in 1569 by Jansenius, Bishop of Ghent, and placed in the theological chair of the University of Louvain. After a residence of seven years he returned to Italy, and was sent by Sixtus V. to France, as companion to the legate. He was made a cardinal on account of his learning, by Clement VIII., and in 1602 created Archbishop of Capua. At the elections of Leo XI. and Paul V. he was thought of for the pontificate, and might have been chosen had he not been a Jesuit. Paul V. recalled him to Rome, on which he resigned his archbishopric without retaining any pension on it as he might have done. Bellarmino had the double merit with the court of Rome of supporting her temporal power and spiritual supremacy to the utmost, and of strenuously opposing the reformers. The talent he displayed in the latter controversy called forth similar ability on the Protestant side; and for a number of years no eminent divine among the reformers failed to make his arguments a particular subject of refutation. The great work which he composed in this warfare is entitled 'A Body of Controversy,' written in Latin, the style of which is perspicuous and precise, without any pretension to purity or elegance. He displays a vast amount of Scriptural learning, and is deeply versed in the doctrine and practice of the Church in all ages. His maxims on the right of pontiffs to depose princes caused his work on the temporal power of the popes to be condemned at Paris. On the other hand, it did not satisfy the court of Rome, because it asserted, not a direct, but an indirect, power in the popes in temporal matters; which reservation so offended Sixtus V., that he placed it among the list of prohibited books. His society thought so highly of his sanctity, that proofs were collected to entitle him to canonization; but the fear of giving offense to the sovereigns whose rights he oppugned has always prevented a compliance with the ardent wishes of the Jesuits. His controversial works were published at Prague in 1721, and again at Mayence in 1842. Of his other works the most important is his 'Christianæ Doctrinæ Applicatio' (1603)—a work originally composed in Italian, but since translated into all European languages. He left an autobiography, which was re-issued and annotated by Dollinger and Reusch (1887).

Bellary, bĕl-lā'rĕ, or **Ballari**, a town in India, in the presidency of Madras, capital of a district of the same name, 280 miles northwest of Madras. It is the headquarters of the troops belonging to the districts of Bellary and Kadapa, and possesses two forts, one built on the summit, and the other on a lower eminence of a huge granite rock about two miles in circumference, and rising to the height of about 450

feet from the ground. Bellary is the terminus of a branch line of the Madras Ry., and carries on an active trade in cotton. Pop. about 60,000.

Bellay, bĕ-lā, **Joachim du**, distinguished French poet, known as the French Ovid: b. about 1524; d. 1560. He joined Ronsard, Daurat, Jodelle, Belleau, Baif, and De Tisard in forming the 'Pleiad,' a society, the object of which was to bring the French language on a level with the classical tongues. Bellay's first contribution was 'La Défense et Illustration de la Langue Française.' His chief publications in verse are 'Recueil de Poésie'; a collection of love-sonnets called 'L'Olive'; 'Les Antiquités de Rome,' a series of sonnets; 'Les Regrets'; and 'Les Jeux Rustiques.' In 1555 he became canon of Notre Dame, and a short time before his death he was nominated archbishop of Bordeaux. A statue of Bellay was unveiled in Ancenis in 1894. Spencer translated some of his Roman sonnets into English; and there are translations of poems by him in Andrew Lang's 'Ballads and Lyrics of Old France.' See 'Life' by Seche' (1880); Pator, 'Studies in the History of the Renaissance' (1888).

Belle-Alliance, bĕl-a-lĕ-āns, a farm 13 miles south of Brussels, famous as the position occupied by the centre of the French army in the battle of Waterloo, 18 June 1815. By the Prussians the battle was called that of Belle Alliance.

Belle Chocolatière, bĕl-shō-kō-la-tyār, **La**, a noted portrait by the artist Liotard of the Princess Dietrichstien, who, prior to her marriage, was a waitress in a café in Vienna. The painting is now in the Dresden Gallery.

Belle-Isle, bĕl-ĕl, or **Belle-Isle-en-Mer** (anciently **VINDILIS**), an island in the Bay of Biscay, belonging to France, in the department of Morbihan, eight miles south of Quiberon Point, about 11 miles long, and 6 miles across at the widest point. The soil is diverse, consisting of rock, salt marsh, and fertile grounds. Palais is the capital. The island is of much interest historically. In 1747 the French fleet was defeated by Admiral Hauke off the island, and it was captured by the English in 1761. Pilchard and sardine fishing is the important industry. Pop. 10,000.

Belle-Isle, an island, 15 miles north of Newfoundland and northeast of the Gulf of St. Lawrence, about 21 miles in circuit. On the northwest side it has a small harbor, called Lark Harbor, within a little island close to the shore. At the eastern point it has another small harbor or cove that will only admit fishing shallows. A rescue station has been established for persons who may be shipwrecked. Its area is about 15 square miles. At its southern end is a lighthouse whose light is 470 feet above the sea, and visible for 28 miles. The narrow channel between Newfoundland and the coast of Labrador is called the Straits of Bell-Isle. Steamers from Glasgow and Liverpool to Quebec round the north of Ireland commonly go by this channel in summer as being the shortest route.

Belle Isle, Va., an island in the James River, opposite Richmond, where nearly 12,000 Federal prisoners were confined in 1863.

BELLE JARDINERE—BELLEROPHON

Belle Jardinere, bĕl-zhâr-dĕ-nyâr, **La**, a celebrated painting by Raphaël, now in the Louvre. It represents the Madonna with the holy child, and the infant St. John.

Belle Plaine, Iowa, town in Benton County, on the Iowa River and on several railroads; 257 miles west of Chicago. It has flouring mills, furniture factories, creameries, machine shops, broom factories and numerous artesian wells. It was founded in 1862. Pop. (1910) 3,121.

Belle Savage, an old inn, on Ludgate Hill, London, celebrated in coaching days, and frequently mentioned by Dickens and other writers dealing with that period.

Belleau, bĕ-lō, **Rémy**, French poet: b. Nogent-le-Rotrou, 1528; d. Paris, 16 March 1577. He made an elegant and spirited translation of 'The Odes of Anacreon' (1576). His 'Bergerie' (1572), a compound of prose and verse, is of unequal merit; but it contains some passages,—for example, the "April,"—which are of great beauty.

Bellefontaine, Ohio, a city and county-seat of Logan County; on the Cleveland, C., C. & St. L. R.R.; 57 miles northeast of Dayton. It occupies the highest elevation in the State; and is surrounded by an agricultural region. It has extensive car-shops and other railroad works; two national banks; daily and weekly newspapers; an assessed property valuation of \$2,250,000; a total debt of about \$200,000. Pop. (1910) 8,238.

Bellefonte, Pa., a borough and county-seat of Centre County, 87 miles northwest of Harrisburg. It has important lime quarries, iron furnaces, glass works, manufactories and machine shops, and was incorporated in 1800. It is a summer resort much visited for its scenery and noted for its spring, whose waters have supplied the borough since 1807. Pop. (1910 est.) 4,750.

Bellegarde, bĕl-gârd, **Henri** (COUNT DE), French writer: b. Piria, 30 Aug. 1648; d. Paris, 1707. He was a member of the community of priests of St. Francis de Sales, and the recognized author of the 'Universal History of Voyages' (1707).

Belleisle, bĕl-ĕl, **Charles Louis Auguste Fouquet** (COMTE DE), marshal of France: b. Villefranche, 22 Sept. 1684; d. Versailles, 26 Jan. 1761. He distinguished himself during the famous siege of Lille, and became brigadier in the royal forces. After the conclusion of the war of the Spanish Succession he went with Marshal Villars to Rastadt, where he displayed diplomatic talents. The cession of Lorraine to France in 1735 was principally his work. Cardinal Fleury reposed confidence in him; Louis XV. made him governor of Metz and the three bishoprics of Lorraine, which office he held until his death. Before the breaking out of the war in 1741 he visited the principal courts of Germany with the design of disposing them, after the death of Charles VI., to choose the elector of Bavaria emperor of Germany; and he displayed so much address on this occasion as to excite the admiration of Frederick II. After his return he placed himself at the head of the French forces sent to oppose those of Maria Theresa. He took Prague by assault; but, the king of Prussia having made a separate peace, he was compelled to a retreat which he per-

formed with admirable skill. In December 1744, when on a diplomatic journey to Berlin, he was arrested in Germany and sent to England, but he was exchanged in 1746. In the following year he forced Gen. Browne, who had entered the south of France from Italy, to raise the siege of Antibes and to retreat over the Var. In 1748 the king made him a duke and peer of France, and the department of war was committed to his charge. He reformed the army by abolishing many abuses, enlarged the military academy, and caused an order of merit to be established.

Bellenden, William, Scottish writer: b. Lasswade (?) Midlothian, about 1555; d. about 1633. He was educated at Paris, where he was professor of belles-lettres in 1602; and though he was made master of requests by James I. he still continued to reside in the French metropolis. He was distinguished for the elegance of his Latin style, and in 1608 he published a work entitled 'Ciceronis Princeps,' containing a selection from the works of Cicero, consisting of passages relating to the duties of a prince, etc. He afterward published 'Ciceronis Consul,' 'Senator,' etc., with two other treatises, from one of which Conyers Middleton's 'Life of Cicero' was largely compiled—a plagiarism denounced by Dr. Parr in a Latin preface prefixed to a re-issue of Bellenden's writings (1787).

Bellermann, Ferdinand, German painter: b. Erfurt, 14 March 1814; d. Berlin, 11 Aug. 1889. He was educated at the academy at Weimar, and studied later at Berlin under Karl Blechen and Wilhelm Schirmer. He traveled in Norway, the Netherlands, Venezuela, and Italy, and in 1866 became professor of landscape painting at the Berlin Academy. He utilized the results of his travels in the production of many magnificent landscapes, among which may be mentioned 'Evening in the Valley of Caracas'; the 'Guacharo Cave, Venezuela'; 'Sierra Nevada'; etc.

Bellerophon, bĕl-lĕ'rō-fōn, son of Glaucus, king of Ephyre, by Eurymede, at first called Hipponous. The murder of his brother, whom some call Alcimenus and Bellerus, procured him the name of Bellerophon, or murderer of Bellerus. After this murder Bellerophon fled to the court of Proetus, king of Argos, whose wife became enamored of him; and because he slighted her passion she sought to destroy him. He escaped her machinations, was introduced to the court of Jobates, king of Lycia, and, after a number of adventures, in one of which he conquered the Chimæra, he married the daughter of Jobates and succeeded to the throne of Lycia. The latter days of Bellerophon were unfortunate. Attempting to soar to heaven on the back of Pegasus, Zeus sent a hornet which so stung his winged steed that he cast his rider to the earth, where lame and blind he wandered lonely in the Aleian fields, a prey to corroding grief and melancholy, shunning men, and hated by the gods.

Bellerophon, a genus of gasteropodous mollusks, typical of the family *Bellerophonitida*. The species are all fossil shells found in the limestones of the Silurian, Devonian, and Carboniferous periods. The best-known American species are found in the coal measures of the Mississippi valley and the southwest. The so-

BELLES-LETTRES — BELLIARD

called *B. cilobatus*, a fossil characteristic of the Trenton formation, is now assigned to the genus *Protowarthia*.

Belles-lettres, bĕl-lĕtr, the French term, for which the English equivalent is polite literature. It is impossible to give a satisfactory explanation of what is or has been called belles-lettres; in fact, the vaguest definition would be the best, as almost every branch of knowledge has at one time been included in, at another excluded from, this denomination. The most correct definition, therefore, would be, perhaps, such as embraced all knowledge and every science not merely abstract or simply useful. In the division of the departments at the Lyceum of Arts, established at Paris in 1792, the belles-lettres comprehended general grammar, languages, rhetoric, geography, history, antiquities, and numismatics; while philosophy, mathematics, etc., were called, in contradistinction, sciences.

Belleval, Pierre Richer de, bĕl-vāl, pĕ-är rĕ-chā dé, French botanist: b: Chalons-sur-Marne c. 1564; d. 1623. He was the first person in France who taught botany as a science distinct from medicine. Henry IV. established a botanical garden at Montpellier, and created a chair of botany. Belleval obtained the first appointment in 1593, and immediately began a collection of all the plants in Languedoc, in order to the production of an illustrated flora, for which about 500 quarto plates had been engraved, when he died. Through the carelessness of his representatives, almost all of these were lost.

Belleville, bĕl-vīl, Canada, town, port of entry, and county-seat of Hastings County, Ontario, on the Bay of Quinte, at the mouth of the Moira River. It is on the Grand Trunk Railway and 60 miles west of Kingston. It has an excellent harbor, and the Moira affords abundant water-power for manufacturing. Belleville is in the heart of the finest dairying region of Canada; is in direct steamboat communication with many Canadian and United States points, and enjoys an extensive trade, especially in lumber. It has 13 churches. It is the seat of Albert College, which has an arts course, music, etc., and was established in 1857. The Ontario Business College, Belleville Business College, Saint Agnes Ladies' School, public and high schools, deaf and dumb institute, and public library are some of its institutions. The chief manufactures are lumber, pottery, cigars, sash and blinds, woollens, shirts, mining tools, machinery, lanterns, and tinware. A short distance east of Belleville are large cement works for the utilization of a limestone which exists in great abundance in the vicinity. The city has agencies for the principal banks of Canada, daily and weekly newspapers, and is the seat of a United States consulate. Pop. about 10,000.

Belleville, Ill., a city and county-seat of Saint Clair County; situated on several rail roads; 14 miles east of Saint Louis, Mo. It is in the midst of very productive coal mines; has a large trade in flour, and general produce; and is chiefly engaged in the manufacture of glass, stoves, flour, nails, and machinery, and has one of the largest rolling mills in the West. The city has trolley lines to Saint Louis, a public library, Saint Peter's Cathedral (Roman Catholic), convent, four national banks, and an assessed property valuation of over \$2,250,000. Pop. (1910) 21,122.

Bellevue, Ky., a city on the Ohio River opposite Cincinnati, of which it is practically a suburb. It is almost exclusively a city of residences. Pop. (1910) 6,683.

Bellevue, bĕl-vü, Ohio, a village on Lake S. & M. S., Wheeling & L. E., and Nickel P. R.R.'s; situated in Huron and Sandusky counties; about 16 miles south of Sandusky. It has manufactures of agricultural implements, and a large farming trade. Pop. (1910) 5,209.

Bellevue, bĕl-vü (French, "fine prospect"), a name given to various villas and palaces, but particularly to a beautiful country palace in the neighborhood of Paris, situated on a ridge of hills stretching from St. Cloud toward Meudon. It was built by Mme. de Pompadour, commenced in July 1748, and finished in November 1750. The first French artists of the time had exerted all their talents in embellishing it; so that at the period when it was built, it was considered the most charming in all Europe. After the Revolution the Convention decreed that Bellevue should be kept in repair at the expense of the nation, and devoted to public amusements. Nevertheless it was publicly sold during the highest pitch of revolutionary excitement, and the purchaser had it demolished. There is a pretty village on its site, which, during the siege of Paris (1870-1) was an important strategic point.

Bellevue Hospital, New York, a hospital situated on the East River, between 26th and 27th streets. It is the seat of a medical school of high rank, and has accommodations for about 1,300 patients.

Belley, bĕl-lā, France (ancient **BELLICA**), a town in the department Ain, 39 miles southeast of Bourg, and 38 miles southwest of Geneva; situated in a fertile valley watered by the Furan. It is very ancient, having been a place of note in the time of Julius Cæsar, and is the seat of a bishopric founded in 412. It contains a communal college, has an agricultural society, and a court of primary resort. The episcopal palace, the belfry of the cathedral, the college, and the rich cabinet of medals and antiquities, are worth notice. Silk worms are reared; and lithographic stones, reckoned the best in France, are obtained from quarries in the neighborhood. Pop. about 7,100.

Belli, Giuseppe Gioachino, bĕl'lĕ, joo-sĕp'pĭ jō-kĕ'nō, Roman humorist and satirical poet: b. 1791; d. 1863. He wrote in the popular dialect of the Trastevere; and in early life scourged the papacy and the clergy with stinging, irreverent, and often vulgar satire. Becoming afterward a zealous convert to the Roman faith, he endeavored to call in and destroy the indiscretions of his youth. In his last years he published a beautiful translation of the Roman Breviary. His published sonnets amount to more than 2,000; his other published Italian verses fill four considerable volumes; while two thirds of his vast remains have never been gathered and edited. Of this last, much is clothed in language too coarse to bear the light of modern culture.

Belliard, Augustin Daniel, bĕl-yār, ô-goos-tān dān-vĕl (COUNT DE), French soldier and diplomatist: b. Fontenay-le-Comte, La Vendée, 1769; d. 27 Jan. 1832. He entered the military service very early, and Dumouriez soon made

BELLIGERENT — BELLINI

him an officer of his staff. Under Napoleon, serving in Egypt, Germany, Spain, and Russia, he rose to great military distinction. After the emperor's abdication he received the order of Saint Louis from Louis XVIII. and was made a peer and major-general of the French army.

Belligerent, a nation or a large section of a nation engaged in carrying on war. When a revolted party of great numerical strength are able to form a regular government and rule over the whole or part of the territory which they claim, humanity dictates that they should not be treated as rebels guilty of treason, but should, if captured, be regarded as prisoners of war. To attain this result it is needful for those who have risen in arms against the government to make every effort to obtain for their party the position of belligerents. In the contest between the Federals and Confederates in the War of 1861-5, the latter section of the American people, at the very commencement of the struggle, claimed the privileges of belligerents. Their demand was promptly acceded to by the British government, at which the Federal authorities took umbrage, contending that the recognition had been premature, while the British maintained that it could not have been refused or delayed.

Bellingham, Richard, royal governor of Massachusetts: b. 1592; d. 7 Dec. 1672. He emigrated to the colony in 1634; in 1635 was made deputy-governor; and in 1641 was elected governor in opposition to Winthrop by a majority of six votes. He was re-elected in 1654, and after the death of Endicott was chosen again in May 1665, and continued in the executive chair of the colony as long as he lived, having been deputy-governor 13 and governor 10 years. He was chosen major-general in 1664, in which year the king sent Nichols, Cortright, Coon, and Moresick as commissioners to inquire into the state of the colony, when, according to Hutchinson, Bellingham and others obnoxious to James II. were required to go to England to account for their conduct. The general court, however, refused obedience and maintained the authority of the charter. His wife having died, in 1641 he married a second time, of which a contemporary speaks thus: "A young gentleman was about to be contracted to a friend of his, when on a sudden the governor treated with her, and obtained her for himself." The banns were not properly published, and he performed the marriage ceremony himself. He was prosecuted for a violation of the law, but at the trial he refused to leave the bench, sat and tried himself, and thus escaped all punishment. In his last will he provided that after the decease of his wife and of his son by a former wife, and his granddaughter, the bulk of his estate should be spent for the yearly maintenance "of goodly ministers and preachers" of the true Church, which he considered to be that of the Congregationalists. This will the general court set aside on the ground that it interfered with the rights of his family. A sister of his, Anne Hibbens, was executed at Salem in June 1656, during the witchcraft persecution.

Bellingham, Wash., city, county of Whatcom; on the eastern shore of Bellingham Bay, and on the Great Northern, Northern Pacific, Canadian Pacific, and Bellingham Bay & British Columbia R.R.'s.

History.—The first settlement was made in October 1852 by Capt. Henry Roeder, who built a saw-mill on what is now Whatcom Creek. The Lummi tribe of Indians maintained their chief camp on the beach near the mouth and falls of Whatcom Creek, and called the camp or rather the locality "*Whrap-cop*," meaning "the noisy water" or "the place of the noisy water." The white men retained the Indian name for their town, modified as indicated by the spelling to Whatcom. This remained the name of the town until the consolidation of Whatcom and New Whatcom in 1891 under the name of New Whatcom, from which the prefix "New" was dropped by action of the state legislature 19 Feb. 1901. Fairhaven is the English interpretation of an Indian word or phrase, "*See-see-leechel*," meaning "a safe harbor" or "the sheltered beach." The town was platted and named in 1883 by Daniel J. Harris, the original donation claimant. In 1890 Fairhaven and the adjoining town of Bellingham were incorporated as one city under the name of Fairhaven. On 27 Oct. 1903, the electors of Fairhaven and Whatcom voted to consolidate the two cities under the name of Bellingham and the consolidation was duly consummated. The new name went into effect 28 Dec. 1903, and the post-office became Bellingham 1 April 1904. Bellingham Bay was named by Vancouver in 1792, and the consolidated city takes its name from that bay.

Industries.—The city is the commercial centre of a large lumber and agricultural region; salmon fishing is also an industry of great importance, and mining and quarrying are carried on in the vicinity. The principal manufacturing establishments include lumber and shingle mills, salmon canneries, wood working and iron working plants, and brick kilns. There are four banks with a combined capital of \$405,000.

Churches and Educational Institutions.—There are (in 1904) 27 established churches in Bellingham, representing practically all denominations. There are 11 city schools, including a high school, and two libraries, the Bellingham Bay Library, and the Carnegie Library. The city also contains the State Normal School, and three business colleges.

Government and Population.—The government is vested in a mayor, elected biennially, and a council of seven members, elected alternately every two years. Pop. (1910) 24,298.

FRANK C. TECK,

Bellingham Chamber of Commerce.

Bellini, Gentile, jën-tě'lä, the elder son of Jacopo (q.v.): b. 1421; d. 1501. He became much more distinguished than his father, but did not rival his younger brother, Giovanni. His fame attracted the notice of Mohammed II., conqueror of Constantinople, and Bellini visited the grand seignor, being sent by the Senate. He painted a number of pictures for Mohammed, and also struck a medal for him, with all of which he was greatly pleased, and rewarded the painter by presenting him with a gold chain and 3,000 ducats. A story is told of his exhibiting to Mohammed a picture he had painted of the head of John the Baptist in a charger, and the emperor, who had certainly great experience in decapitation, observing that the muscles of the neck were not correctly drawn, sent for a slave and had his head cut off in the presence of the artist, to convince him

of his mistake. Voltaire ridicules this tale, and Gibbon altogether rejects it. There is a very fine pen-and-ink drawing by Bellini in the British Museum, representing Mohammed and the sultana mother, in whole-length figures in a sitting position. After Gentile's return to Venice, he continued to paint, honored by the patronage of the state and of private individuals, until his death.

Bellini, Giovanni, bēl-lē'nē, jo-vā-ni, Italian painter: b. 1426; d. Venice, 29 Nov. 1516. He was the second son of Jacopo Bellini (q.v.) and generally regarded as the founder of the Venetian school, though he himself was his father's pupil. Some of his earliest works were portraits, among them that of the doge, Leonardo Loredano, now, with another of his masterpieces, 'Peter Martyr,' in the London National Gallery. Having attracted the notice of the government, he was employed by the republic to decorate the great hall of the council with a series of magnificent paintings, covering the entire walls, and designed to represent the proudest historic glories of Venice. These were worthily accomplished, but were destroyed by a fire. Among his scholars were Giorgione and Titian, and it was from him that these masters acquired their magnificent coloring.

Bellini, Jacopo, yā'cō-pō, Italian painter: b. Venice about 1405; d. 1470. He was a pupil of Gentile da Fabriano, and is said to have been taught oil-painting, which was then a secret, by Andrea dal Castagno, and in turn taught it to his sons Gentile and Giovanni (qq.v.). The first works by which he acquired fame were portraits of Catharine Cornaro, the beautiful queen of Cyprus, and one of her brothers; a picture representing the passion of Christ, in which many figures were introduced, himself among the number; and a historical picture representing a Venetian legend of the miracle of the cross. This cross, containing a piece of the true one on which the Saviour died, was by some accident thrown into the Grand Canal at Venice, and although many persons plunged in after it, it was the will of God that only the guardian of the brotherhood to whom the cross belonged, Andrea Vindramino, could take it out again. This event was represented in the painting. Almost all of Jacopo's works have perished; one supposed to be authentic is in the Manfrini palace at Venice and represents the portraits of Petrarch and Laura.

Bellini, Vincenzo, vīn-chēn'zō, Italian composer: b. Catania, Sicily, 1802; d. near Paris, 1835. He was educated at Naples under Zingarelli, commenced writing operas before he was 20, and composed for the principal musical establishments in Europe. His most celebrated works are 'Norma,' 'I Puritani,' and 'La Sonambula.' He is remarkable chiefly for sweetness of melody, suitability of harmony, and an adaptation of sound to sense, and stood honorably distinguished from many of his profession by the excellence of his moral character.

Bellinzona, bēl-in-zō'nā, or **Belleny**, bēl-ā'nē, Switzerland, the capital of the canton of Ticino on the left bank of the Ticino, about five miles from its embouchure in the northern end of Lago Maggiore. It occupies a position of great military importance.

Bellis. See DAISY.

Bellman, Karl Mickel, Swedish poet: b. Stockholm, 1740; d. 1795. He grew up in the quietude of domestic life, and the first proofs he gave of his poetical talents were religious and pious effusions. The dissipated life of young men at Stockholm devoted to pleasure was afterward the subject of his poems. By these his name was spread over all Sweden. Even the attention of Gustavus III. was attracted to him, and he received from the king an appointment which enabled him to devote himself almost entirely to poetical pursuits, in an easy independence, until his death. His songs are truly national, and love and liquor their most common themes.

Bello, Andres, Spanish-American diplomatist and author: b. Caracas, Venezuela, 30 Nov. 1780; d. Santiago, Chile, 15 Oct. 1865. He represented Venezuela in London, 1810-28; in 1829 became an official of the bureau of finance; in 1834 was minister of foreign affairs for Chile; in 1842, the first rector of Santiago University. He was the author of 'Principles of International Law' (1832), and after his death his entire works were printed at the expense of the state.

Belloc', Hilaire, English litterateur: b. 27 July 1870. He is the son of M. Louis Belloc, a French barrister; was educated at Balliol College, Oxford, after serving for a time in the French artillery at Toul, and in 1906 was elected to Parliament as a Liberal. He has published 'The Bad Child's Book of Beasts' (1896); 'More Beasts for Worse Children' (1897); 'The Modern Traveler' (1898); 'The Moral Alphabet' (1899); 'Danton,' a much-admired biography (1899); 'Lambkins Remains' (1900); 'Paris' (1900); 'Robespierre' (1901); 'The Path to Rome' (1902); 'The Old Road' (1905); etc.

Belloc, Marie Adelaide. See LOWNDES, M.A.

Bellomont, Earl of. See BELLAMONT, RICHARD, EARL OF.

Bel'momont, Earl of. See COOTE, RICHARD.

Bello'na, the goddess of war, daughter of Phorcys and Ceto. She was called by the Greeks *Enyo*, and is often confounded with Minerva. She was anciently called *Duellona*, and was the sister of Mars, or, according to some, his daughter or his wife. She prepared his chariot when he was going to war, and drove his steeds through the tumult of the battle with a bloody scourge, her hair dishevelled and a torch in her hand. The Romans paid great adoration to her; but she was held in the highest veneration by the Cappadocians, chiefly at Comana, where she had above 3,000 priests. Her temple at Rome was near the Porta Carmentalis. In it the senators gave audience to foreign ambassadors and to generals returned from war. At the gate was a small column, called the "column of war," against which they threw a spear whenever war was declared. The priests of this goddess consecrated themselves by making great incisions in their bodies, and particularly in the thigh, from which they received the blood in their hands to offer as a sacrifice to the goddess. In their wild enthusiasm they often predicted bloodshed and wars, the defeat of enemies, or the besieging of towns.

Belloc, Joseph René, bēl-lō, zhō-sef rē-nā, French naval officer: b. Paris, 1826; d. 1853. At the age of 16 he entered the naval academy at

BELLOT STRAIT—BELLOY

Brest, and two years afterward received a commission as *élève de marine* on board the *Berceau*. He was promoted for bravery to the rank of *élève* of the first class, and also created a chevalier of the Legion of Honor, though not yet 20 years old. On his return to France in 1847 he was made a sub-lieutenant, and shortly after a two-years' voyage to South America in the *Triomphante* he volunteered his services on the Royal Albert schooner, fitted out by Lady Franklin, in June 1851, to search for her husband, Sir John Franklin. The expedition failed in its main object, but an interesting journal of it, kept by Bellot, was published after his death. In June 1853, he sailed again on board the *Phoenix*, under command of Capt. Inglefield, on a new Arctic expedition, the principal object of which was to convey dispatches to Sir Edward Belcher, then commanding H.M.S. *Assistance* in the Polar seas. Arrived in Erebus and Terror Bay, where lay the North Star, whose commander, Capt. Pullen, was absent on a journey of discovery, Capt. Inglefield set out in search of him; but in his absence it became desirable to get the dispatches conveyed to Sir Edward Belcher—a duty which Lieut. Bellot undertook to perform by crossing the ice. Having set out with four sailors, a canoe, and a sledge, the party got separated in a gale of wind on 18 August, and Bellot, with two others, drifted away on a piece of ice. With the view of ascertaining the direction the ice was taking, he crossed over to the opposite side of the hummock and was never seen more. A handsome granite obelisk was erected to his memory in front of Greenwich Hospital, and a provision was made for his sisters.

Bellot Strait, the passage on the north coast of North America which separates North Somerset from Boothia Felix and connects Prince Regent Inlet with Franklin Channel. Its eastern entrance was discovered in 1852 by Lieut. Bellot (q.v.). After four unsuccessful attempts it was explored for the first time by McClintock on his crowning voyage. It is about 20 miles long, and, at its narrowest part, about one mile wide, running nearly on the parallel of 72°, between granite shores which, everywhere high, rise here and there to 1,500 or 1,600 feet. Through this funnel both the winds and the waters have full play; the latter, permanent currents and flood tides alike, coming from the west. A point on the southern shore, 71° 55' N., 95° W., is the most northerly point of the North American continent.

Bellotto Bernardo, Italian painter and engraver: b. Venice, 1724; d. Warsaw, 1780. He studied under his uncle, Antonio Canal, and painted perspective and architectural views. He passed much time in Germany and was a member of the Academy of Dresden, where many of his pictures are exhibited. He etched, from his own designs, views of Vienna, Dresden, and Warsaw. His pictures are called by the name of CANALETTO, which he assumed.

Bellows, Albert F., American painter: b. Milford, Mass., 20 Nov. 1829; d. 24 Nov. 1883. He was one of the first to succeed with water-colors. He studied in Antwerp, Paris, and England, becoming a National Academician (1861), and an honorary member of the Royal Belgian Water Color Society (1868).

Bellows, Henry Whitney, American Unitarian clergyman and writer: b. Walpole, N. H., 11 June 1814; d. 30 Jan. 1882. He became pastor of All Souls Church, New York, 1839; was chief founder and long editor of the 'Christian Inquirer' (1846); chief originator of the United States Sanitary Commission, and its president during the Civil War (1861-5). He wrote 'Public Life of Washington' (1866); 'Relation of Public Amusements to Public Morality'; 'The Old World in Its New Face' (2 vols. 1868-9), a record of travel in Europe. He was an effective preacher and public speaker.

Bellows, a machine for blowing fire, so formed as, by being dilated and contracted, to inhale air by an orifice which is opened and closed by a valve, and to propel it through a tube upon the fire. The invention of bellows is ascribed to Anacharsis the Scythian, though probably it took place in different countries. The forms of bellows at present are very various, as many attempts have been made for the improvement of this highly important machine, which becomes necessary wherever a powerful flame is required in the arts. As mining was carried on at an early date in Germany, and great heat is required in smelting the ores and working the metals, various new kinds of bellows were invented in that country, one of which consists of an empty box, which moves up and down in another, partially filled with water. Between the bottom of the empty box and the surface of the water is a space filled with air, which is driven out by the descent of the enclosed box. Bellows of very great power are generally called blowing-machines (q.v.). The common Chinese bellows consist of a box of wood about two feet long and one foot square, in which a thick, square piece of board, which exactly fits the internal cavity of the box, is pushed backward and forward. In the bottom of the box, at each end, there is a small conical or plug valve to admit the air, and valves above to discharge it.

Bellows Falls, Vt., a town in Windham County, on the Connecticut River, so called from several rapids and cataracts occurring there. The whole descent is about 44 feet. It was formerly a famous place for spearing salmon. A canal with locks has been cut around the falls, through the solid rock. The scenery is romantic, and various interesting minerals are found in the vicinity. The town contains several mills and manufactories, and is remarkable for its handsome dwellings. Pop. (1910) 4,337.

Bellows-fish. See GLOBE-FISH.

Belloy, Pierre Laurent Buirette de, bēl-lwā, pē-ār lōr-ōn bwē-rēt dē, French dramatist: b. St. Flour, Auvergne, 17 Nov. 1727; d. 5 March 1775. The first French dramatist who successfully introduced native heroes upon the French stage. He was designed by his uncle, a distinguished advocate in the parliament of Paris, who reared him after his father's death, for his own profession, but while he applied himself to the law with reluctance, he showed much genius for the drama. His uncle opposed this taste, and the young man secretly left his house. He next made his appearance as an actor under the name of "Dormont de Belloy." Belloy had hoped to reconcile his family to him by the success of his first tragedy, 'Titus,' but this hope was disappointed by the failure of the

BELL'S PALSY — BELMONTET

piece; and the author went to St. Petersburg. He returned to France, where he brought out his tragedy 'Zelmire,' which met with complete success. In 1765 followed his 'Siege of Calais,' a tragedy which produced a great sensation, and is still esteemed, though it owes the applause bestowed on it rather to its subject than to its poetical merit. He received the medal promised by the king to those poets who should produce three successful pieces, and which was awarded on this occasion only, the 'Siege of Calais' being counted as two, it being, in fact, only the second successful piece of Belloy. The city of Calais sent him the freedom of the city in a gold box. Belloy wrote sundry other dramatic pieces, of which 'Gaston and Bayard' procured his reception into the Academy.

Bell's Palsy, named after Sir Charles Bell (q.v.), a palsy of the muscles of the face supplied by the seventh or facial nerve, and due to some peripheral lesion, in distinction to facial palsy of a central, or of a nuclear origin. It may occur on both sides of the face. The causes are many, but exposure to cold, such as sleeping in the open with the wind blowing over the face, or sitting by an open window in a railway train or steamboat, is one of the most frequent causes. It may also occur in a multiple neuritis that is due to poisoning by alcohol, lead, arsenic, or the poison of diphtheria, etc., and in rare instances from fractures of the skull. It comes on suddenly, the patient often waking in the morning to find one side of his face stiff, and in two or three days the palsy has developed. There is a sense of discomfort on the paralyzed side. The patient cannot close one eye completely and cannot manage his food on the affected side. He cannot whistle, and his speech is peculiar. The wrinkles of the paralyzed side are smoothed out and every motion of the facial muscles seems to be an exaggerated one, so that many patients say their face is drawn to one side. The reality being that it is the opposite side that is affected and immovable. The paralysis usually gets well in from three to five months, especially if the treatment is begun early and perseveringly followed out. Some patients never entirely recover, although much improvement takes place in practically all. The treatment is electrical, massage, and general tonics. Particular attention should be paid to the care of the paralyzed eyelid. See also **FACIAL PARALYSIS**.

Consult: Starr, 'Text-book of Organic Nerve Diseases' (1903).

Belluno, Italy, a northern city, capital of a province of the same name, on the Piave, 48 miles north of Venice. It has a cathedral, a handsome theatre, etc.; and manufactures of silk, straw-plait, leather, etc. Pop. about 18,348.

Bel'mont, August, American banker: b. Alzey, Germany, 1816; d. 24 Nov. 1890. He was educated at Frankfort, and was apprenticed to the Rothschild's banking house in that city when 14 years old. In 1837 he went to Havana to take charge of the firm's interests, and soon afterward was sent to New York, where he established himself in the banking business and as the representative of the Rothschilds. He was consul-general of Austria 1844-50; became charge d'affaires at The Hague in 1853; and was minister-resident there in 1854-8. He was

a delegate to the Democratic National Convention in 1860, and when a portion of the delegates withdrew and organized the convention in Baltimore he was active in that body, and through it became chairman of the National Democratic Committee, an office he held till 1872. He was an active worker in the party till 1876, when he closed his political career.

Belmont, August, American banker: b. New York, 18 Feb. 1853; son of the preceding. He was graduated at Harvard University in 1875; at once entered his father's banking house, and on the death of his father became head of the firm of August Belmont & Company, also representing the European banking firm of the Rothschilds. In February 1900 he organized the Rapid Transit Subway Construction Company to back John B. McDonald, who had been awarded the \$35,000,000 contract for the construction of a rapid-transit system in New York. The house, under the management of the son, has continued to exert the large influence in the financial and railroad affairs of the city and country that it gained under its founder.

Belmont, Perry, American lawyer: b. New York, 28 Dec. 1851 (son of August Belmont 1816-90). He was graduated at Harvard University in 1872, and at Columbia College Law School in 1876; was admitted to the bar and practised in New York till 1881, when he was elected as a Democrat to Congress and served till 1887, being a member of the Committee on Foreign Affairs, and in that capacity, in his first term in Congress, came into notice by his cross-examination of J. G. Blaine, then ex-secretary of state, as to his relations with a syndicate of American capitalists interested in Peruvian guano. In 1885 he was appointed chairman of the Committee on Foreign Affairs, and in 1888 United States minister to Spain. In 1889 he was commissioner to the Universal Exposition in Paris, and for his services received from the President of France, in 1890, the decoration of commander of the Legion of Honor. He was one of the principals in the rapid-transit contract in New York, in which his brother August (q.v.) was interested.

Belmont, Cape Colony, a town midway between Orange River Junction and Kimberley. It was the scene of one of the earliest engagements in the war of 1899-1900, between the Boers and the British under Gen. Lord Methuen. The town was attacked by the British on 23 Nov. 1899, while on the march to the relief of Kimberley, and the battle resulted in a victory for them. Two days later Lord Methuen took Graas Pan, 10 miles north of Belmont, after again defeating the Boers.

Belmont Park, N. Y., a racing field on Long Island, 15 miles from New York city, probably the most magnificent establishment devoted to horse-racing in the world. The park covers an area of 666 acres, laid out in groves and gardens, among which are placed the palatial club buildings and stables.

Belmontet, bël-môn-tă, Louis, French poet and publicist: b. Montauban, 26 March 1799; d. Paris, 14 Oct. 1879. He studied and practised law in Toulouse until involved in difficulties with the magistracy on account of some satirical poems, when he went to Paris and there produced his principal works: 'The Sad Ones'

(1824), a cycle of elegies; 'The Supper of Augustus' (1828); and with Soumet, 'A Festival of Nero' (1829), a tragedy which exceeded 100 performances. In 1830 he edited the *Tribune* newspaper, opposed the accession of Louis Philippe, and predicted his downfall and a second revolution in a bold pamphlet addressed to Chateaubriand, for which he was arrested. In 1839 he established, together with Messrs. Laffitte and Mauguin, a manufactory, in which the men were to share the benefits with the employers. In 1852 he became a member of the legislative assembly. Subsequently he became an ardent partisan of Bonapartism, pleading its cause as a journalist and poetically extolling the Napoleonic dynasty in many enthusiastic odes.

Belodon, an extinct reptile of the Triassic Period, partly intermediate between dinosaurs and crocodiles, but with many archaic characters. The body was protected by bony plates, those on the back interlocking by a peg-and-socket joint. The snout was long and narrow, the external nares behind in contrast to their position in modern crocodiles, where they are at the tip of the snout. The limbs were longer than those of modern crocodiles, but the proportions were otherwise similar. Its remains have been found in the Triassic coal-beds of North Carolina and Pennsylvania, and the red beds (estuarine sediments) of New Mexico, as well as in European strata of corresponding age.

Beloe, William, English clergyman and writer: b. 1756; d. 1817. He was educated at Cambridge, and was presented to the rectory of All-hallows, London Wall, and subsequently to stalls in Lincoln Cathedral and St. Paul's. In 1803 he became keeper of the printed books in the British Museum. His chief publications are, 'Anecdotes of Literature and Scarce Books' (6 vols. 1806-12); a translation of Herodotus with a commentary; and 'The Sexagenarian' (1817).

Beloit, Wis., a city in Rock County, on the Rock River, and the Chicago & N. W. and Chicago, M. & St. P. R.R.'s, 85 miles southwest of Milwaukee and 91 miles west of Chicago. The city derives fine power for manufacturing from the river; and has the second largest wood-working machinery plant in the world, beside manufactories of gas-engines, windmills, iron, paper-mill machinery, plows, paper, rye flour (the oldest mill of its kind in the country), and bicycles. The city is widely known as the seat of Beloit College (q.v.). It was first settled in 1836. Pop. (1910) 15,125.

Beloit College, a co-educational (non-sectarian) institution in Beloit, Wis.; organized in 1847 by the Congregational and Presbyterian Churches; reported at the end of 1910: Professors and instructors, 30; students, 506; volumes in the library, 32,000; grounds and buildings valued at \$335,000; productive funds, \$1,171,720; income, \$94,000; number of graduates, 1,117; president, Edward D. Eaton, LL.D.

Bel'omancy, divination by arrows, practised by the ancient Scythians and other nations. One of the numerous modes was as follows: A number of arrows, being marked, were put into a bag or quiver, and drawn out at random; and the marks or words on the arrow drawn determined what was to happen. See Ezek. xxi. 21.

Beloochistan. See BALUCHISTAN.

Belot, bē-lō, Adolphe, French novelist and dramatist: b. Pointe-à-Patre, 6 Nov. 1829; d. Paris, 17 Dec. 1890. He traveled extensively and settled at Nancy as a lawyer. He won reputation with a witty comedy, 'The Testament of César Girodot' (1859, with Villetard); and, being less successful with his following dramatic efforts, devoted himself to fiction. Of his novels may be mentioned: 'The Venus of Gordes' (1867, with Ernest Daudet); 'The Drama of the Rue de la Paix' (1868); 'Article 47' (1870); all of which were dramatized.

Belper, England, a market town of Derbyshire, on the left bank of the Derwent, over which there is a handsome stone bridge of three arches; seven miles north of Derby, on the Midland Railway. It has three churches, besides other places of worship, a public hall, with reading-rooms, library, etc. There are large cotton-mills, hosiery works, engineering works, and foundries. It is a thriving town and has been very much improved since about 1890. Pop. about 10,920.

Bel'phegor. 1. An arch-demon appointed by Pluto and his council to undertake an earthly marriage, who fled unable to endure female companionship. He has been made the subject of one of La Fontaine's 'Contes,' and also of an English play by Wilson, published in 1691.

2. An English play by Charles Webb, translated and adapted from the French 'Paliasse,' in which the chief character is Belphegor, a mountebank.

3. One of the deities of the Moabites.

Belsham, Thomas, English Unitarian clergyman: b. 1750; d. 1829. He became theological tutor of an academy at Davenport in 1781. At this time he was a Calvinist, but a change of views unfitted him for this situation, and he became tutor of an academy which had been recently established at Hackney. This institution soon failed for want of funds, and Belsham removed first to the Gravel Pit Chapel, which had been occupied by Dr. Priestly, and afterward to Essex Street Chapel, where he officiated for some time as the colleague of Lindsey, and latterly as sole pastor till his death in 1829. His works are chiefly of a controversial nature, and probably attracted attention as much from the celebrity of the works which they attacked as from their own merits. His first appearance in the polemical field was as an opponent of Wilberforce, of whose celebrated 'Practical View of the Prevailing Religious Systems' he published a review. He also published 'Memoirs of Mr. Lindsey,' which was reviewed by the celebrated Robert Hall.

Belsham, William, English writer: d. 1827, aged 75. He published in 1789 'Historical, Political, and Literary Essays' (2 vols. 8vo.); and he subsequently wrote on the test law, the French Revolution, parliamentary reform, and other subjects; but his principal work is a 'History of Great Britain, from the Revolution to the Treaty of Amiens' (1793-1806), 12 vols. 8vo.).

Belshazz'ar, the last of the Chaldean dynasty who reigned at Babylon. He is supposed to have been the son of the Nabonnedus of Berossus, Labynetos of Herodotus, and Nabonides of Josephus, and to have been adopted by

his father as joint king some time before the fall of Babylon. He perished 538 B.C. during the successful storming of Babylon by Cyrus. The interesting circumstances which immediately preceded this event, and are recorded at length in the book of Daniel, have repeatedly furnished subjects to painters and poets.

Belt, The Great and Little, two straits of Denmark, connecting the Baltic with the Cattegat. The former runs between the islands of Zealand and Funen, and is about 15 miles wide, where it is crossed from Nyborg, in Funen, to Corsoer, in Zealand. The greatest breadth of the strait is 20 miles. The navigation is very dangerous, on account of the many small islands and sandbanks by which the channel is impeded. The Little Belt is between the island of Funen and the coast of Jutland, and the narrowest part of the strait is not more than a mile wide. At this place stands the fortress Fredericia, where tolls were formerly paid. The fortress completely commands the entrance from the Cattegat. The Sound, between Zealand and the Swedish coast, is preferred for all large vessels entering or leaving the Baltic.

Belt, in astronomy, a varying number of dusky, belt-like bands or zones encircling the planet Jupiter parallel to his equator, as if the clouds of his atmosphere had been forced into a series of parallels through the rapidity of his rotation, and the dark body of the planet was seen through the comparatively clear spaces between.

Beltane. See BAAL.

Belton, Texas, a city and county-seat of Bell County, situated on the Leon River, northeast of Austin City, and on the Gulf C. & S. F., and the Missouri, K. & T. R.R.'s. Baylor Female College is located here. It is in a cotton-growing district, near some good building-stone quarries, and has a considerable export trade; its chief manufactures are cotton-mills, a cotton-seed oil-mill, flour-mills, and foundries. Pop. (1910) 4,164.

Beltraffio, bēl-trāf'yō, or Boltraffio, Italian painter: b. Milan, 1467; d. 1516. He was a pupil of Leonardo da Vinci and imitated him in the treatment of his subject and in the use of color. Among his works are several portraits and a 'Madonna of the Casio Family.'

Beltrame, Giovanni, bēl-tra'mā, jō-vān'nē, Italian philologist and missionary: b. 11 Nov. 1824. In 1854 he was sent in a missionary party to Khartum up the Blue Nile to Fazogl; in 1858 he went with Knoblecher and other missionaries up the White Nile to Gondokoro, whence he made several journeys into a country at that time wholly unknown. He returned to Italy in 1862 and occupied himself principally with researches in the languages of the Nile country. Among other philological works he published a grammar and a dictionary of the Denka speech. He was author also of 'Di un Viaggio sul Fiume Bianco nell' Africa Centrale'; 'Il Sennaar e lo Sciangallah'; 'Il Fiume Bianco e i Denka,' and 'In Palestina.'

Beltrami, Eugenio, bēl-tra'mē, yoo-jān'yo, Italian mathematician: b. 16 Nov. 1835; d. 18 Feb. 1900. He studied at Pavia. In 1862 he was professor at Bologna, then professor at Pisa, Rome, and Pavia, and in 1891 again at

Rome. He was president of the Academy of the Lincei. His work has been chiefly in non-Euclidian geometry; also in electricity, and magnetism. His 'Mathematical Works' (1902), and 'Bibliography of Mathematics' (1901), were published by the University of Rome after his death.

Beltrami, Giovanni, jō-vān-nē, Italian lapidary: b. Cremona, 1779; d. 1854. He was self-educated and at the time of French rule in Italy found a patron in Eugene Beauharnais for whom he made a chain of 16 cameos, illustrating the story of Psyche. Among his other notable works is a reproduction of the 'Last Supper' of Leonardo da Vinci on a topaz.

Beluga, bē-loo'gā, an old name, adopted as the name of its genus, of the white whale (q.v.).

Beluga, or Bielaga, bē-lā'gā. See STRUGGEON.

Be'lus, the Roman name of the Assyrian and Babylonian divinity called Bel in Isaiah xli. 1.

Belus, a Phœnician river at the base of Mount Carmel. Its fine sand, according to tradition, first led the Phœnicians to the invention of glass.

Belus, Temple of, an enormous temple in ancient Babylon, rebuilt by Nebuchadnezzar about 604 B.C. Its site is thought by some authorities to be the modern Bers-Nimrud, and by others, Babil, both situated near Hillah.

Belvedere, bēl-vē-dēr', or It. bāl-vā-dā'rē (It. 'fine sight.' See BELLEVUE). A name given in Italy to buildings destined for the enjoyment of prospects. The name is also given to small cupolas on houses built for the advantage of fresh air, or of the view which they afford. Many of the buildings in Rome are furnished with such cupolas; yet the term 'belvedere' is generally applied only to those on the palaces of the rich. This is the name also of a part of the Vatican where the famous statue of Apollo is placed, which, on this account, is called Apollo Belvedere.

Belvidere, bēl-vī-dēr', Ill., a city and county-seat of Boone County; on the Kishwaukee River, and the Chicago & N. W. R.R.; 78 miles northwest of Chicago. An important farming and dairying trade centre, and contains railroad shops, one of the largest sewing-machine and bicycle works in the country, manufactory of sewing-machine supplies, flour-mills, creamery, and other industries; and has two national banks, several daily and weekly periodicals, and a property valuation of about \$2,000,000. Pop. (1910) 7,253.

Belzoni, Giovanni Battista, (JOHN BAPTIST), bēl-zō'nē, jō-vān' nē bā-tēs'ta, Italian traveler: b. Padua, 1778; d. 3 Dec. 1823. Destined for a monastic life he was educated at Rome, but left the city when it was occupied by the French, and in 1803 went to England, where he acted in Astley's amphitheatre. Here he acquired, besides an acquaintance with the English language, much knowledge of the science of hydraulics, the study of which had been his chief occupation in Rome, and which afterward carried him to Egypt. He left England after a residence of nine years, and took his way through Portugal, Spain, and Malta, to Egypt. There he lived from 1815 to 1819, at first as a dancer, till he won the favor of the pasha.

Belzoni kept the rude inhabitants of the country in awe by his extraordinary stature and strength. He opened the second of the pyramids of Ghizeh, known by the name of Cephrenes. In the year 1816 he succeeded in transporting the bust of Memnon from Thebes to Alexandria, whence it was taken to the British Museum. In 1817 he entered several catacombs near Thebes, especially one in a fine state of preservation in the valley of Biban el Molook, which is considered to be the mausoleum of Psammetichus, and from which he took the splendid alabaster sarcophagus which is now in the British Museum. On 1 August in the same year he opened the temple of Ipsambul, near the second cataract of the Nile, which two Frenchmen, Cailliaud and Drovetti, had discovered the year before, but had not succeeded in opening. Belzoni discovered a subterranean temple in its ruins, which until that time had been unknown. He then visited the coasts of the Red Sea and the city of Berenice, discovering the emerald mines of Zubara and made an expedition into the Oasis of Jupiter Ammon. Belzoni refuted Cailliaud's assertion, that he had found the famous Berenice, the great emporium of Europe and India, by subsequent investigations on the spot, and by the actual discovery of the ruins of that great city four days' journey from the place which Cailliaud had taken for Berenice. Belzoni's 'Narrative of the Operations and Recent Discoveries within the Pyramids, Temples, Tombs, and Excavations in Egypt and Nubia; and of a Journey to the Coast of the Red Sea in Search of Berenice; also of another to the Oasis of Jupiter Ammon' (Lond. 1820); accompanied by a folio volume of 44 copper-plate engravings, was received with general approbation. Padua, his native city, requited his present of two Egyptian statues from Thebes with a medal by Manfredini. In the year 1823 this enterprising traveler had made preparations for passing from Benin to Houssa and Timbuctoo, when he died at Gato, on his way to Benin, 3 Dec. 1823. He believed the Nile and Niger to be different streams, and that the Niger emptied its waters into the Atlantic Ocean; opinions which have long been proved to be correct.

Bel'zu, Manuel Isodoro, mā'noo-el ē-sō-dōr'o, Bolivian revolutionist: b. LaPaz, 1808; d. March 1866. He led the revolutions of 1847 and 1848, and was killed in a street battle there while leading a revolt against Melgaríjo.

Bem, Josef, a distinguished military commander b. Tarnow, in Galicia, 1795; d. Aleppo, Syria, 1830. He was educated at the University of Cracow, and in 1810 was admitted into the corps of cadets founded at Warsaw by Napoleon, afterward entered the horse artillery, and took part as lieutenant in the expedition of the French army to Russia. For the bravery here displayed by him he received the decoration of the cross of the Legion of Honor. On hearing of the outbreak of the Polish revolution, he at once hurried to Warsaw, and during the whole of the Polish struggle he displayed great gallantry and military skill. On the night of 7 Sept. 1831, he held the bridge of Praga with his artillery, but the following morning, on hearing of the agreement concluded with the Russians, withdrew to Modlin. After the fall of Warsaw he went to Prussia, and in 1832 to Paris, where he was occupied partly with political schemes,

partly with scientific pursuits. Upon the commencement of the Austrian insurrection in 1848, Bem proceeded there, and took a prominent part in conducting the defense of Vienna against the imperial troops. Toward the end of the year he received a commission from the new Hungarian government to undertake the conquest of Transylvania, and crossed over into that territory at the head of a large army, raised by his own exertions in an incredibly short space of time. His progress here was marked by great successes, with occasional checks; and in March 1849 he succeeded in driving the Austrians, with their Russian auxiliaries, into Wallachia. He subsequently made an incursion into the Banat, which he compelled Puchner to evacuate. Returning to Transylvania, he found himself opposed by overwhelming numbers, and, after several reverses, returned to Hungary, where he took part in the disastrous battle of Temesvar. Shortly after he went to Turkey, became a convert to Mohammedanism, and received an appointment in the Sultan's army under the name of Amurath Pasha.

Bema (Gr. *bēma*, a stem), the name applied in the Greek Church to the sanctuary because of its position above the rest of the church. The iconostasis or choir screen divides it from the main portion of the church.

Bembato'ka, Bay of, a safe and commodious bay on the northwest coast of Madagascar, lying in lat. 16° S. and lon. 46° E. The river Betsiboka, with the Ikiopa, drain into the bay; the former, about 300 miles long, is navigable for small steamers for about 90 miles. Mojanga, on the north side of the bay, is the second town in the island, with about 14,000 inhabitants, Bembatoka being but a village.

Bemberg, bän-bär, Henri, French composer: b. Paris, 1861. Besides songs and piano-forte numbers his principal works are 'Le Baiser de Luzon,' a one-act opera (1888); and 'Elaine,' a four-act opera successfully produced in London 1892, and in New York 1894.

Bembecidae, bēm-bīs'ī-de, a family of wasp-like hymenopterous insects with stings, mostly natives of warm countries, and known also as sand-wasps. The female excavates cells in the sand, in which she deposits, together with her eggs, various larvæ or perfect insects stung into insensibility, as support for her progeny when hatched. The insects are very active, fond of the nectar of flowers, and delight in sunshine. *Bembex* is the typical genus of the family.

Bembo, Pietro, a celebrated Italian scholar: b. Venice, 29 May 1470; d. 18 Jan. 1547. At Ferrara he completed his philosophical studies, and after visiting Rome went, in 1506, to the court of Urbino, at that time one of those Italian courts where the sciences stood highest in esteem. In 1512 he went to Rome, where Pope Leo X. made him his secretary. His many labors arising from his office, as well as his literary pursuits, and perhaps too great an indulgence in pleasure, having impaired his health, he was using the baths of Padua when he was apprised of the death of Leo X. Being by this time possessed of several church benefices, he resolved on withdrawing entirely from business, and on passing his days at Padua occupied only with literature and science, and enjoying the society of his friends. Bembo

BEMBRIDGE BEDS—BEN-MUICH-DHUI

collected a considerable library: had a cabinet of medals and antiquities, which at that time passed for one of the richest in Italy, and a fine botanical garden. In the year 1529 the office of historiographer of the republic of Venice was offered to him, which he accepted, declining the salary connected with it. At the same time he was nominated librarian of the library of St. Mark. Pope Paul III., having resolved upon a new promotion of cardinals, from the most distinguished men of his time, conferred on him, in 1539, the hat of a cardinal. From that time Bembo renounced the belles-lettres, and made the Fathers and the Holy Scriptures his chief study. Of his former labors he continued only the 'History of Venice.' Two years later Paul III. bestowed the bishopric of Gubbio on him, and soon after the rich bishopric of Bergamo. A collection of all his works appeared in 1729, at Venice, in four folio volumes.

Bembridge Beds, in geology, a fossiliferous division of the upper Eocene strata, principally developed at Bembridge, in the Isle of Wight, consisting of marls and clays resting on a compact, pale-yellow or cream-colored limestone, called Bembridge limestone. Their most distinctive feature is the mammalian remains of the Palæotherium and the Anoplotherium. The Anita group of Colorado and Wyoming, and the gypsum deposits near Paris, are supposed to belong to the same epoch as the Bembridge beds.

Bementite, a mineral occurring at Franklin Furnace, New Jersey, in radiated-stellate masses. It has a grayish-yellow color and pearly lustre, is soft and has a specific gravity of about 3.0. It is a hydrous silicate of manganese, having the approximate formula of $2\text{MnSiO}_3 \cdot \text{H}_2\text{O}$. It was named in honor of C. S. Bement, whose unrivaled private collection of minerals is now in the American Museum of Natural History in New York city.

Bemis, Edward Webster, American economist: b. Springfield, Mass., 7 April 1860. He graduated at Amherst College in 1880; was a pioneer lecturer in the University Extension System, 1887-8; professor of economics and history, Vanderbilt University, 1889-92; and associate professor of economics, University of Chicago, 1892-5. In 1897 he became professor of economical science in the Kansas State Agricultural College. He published 'History of Co-operation in the United States' (1888); 'Municipal Ownership of Gas' (1891); 'Local Government for the South and Southwest' (1893).

Bemis Heights, N. Y., a village in Saratoga County, on the Hudson River, famous as the scene of the first battle of Stillwater, 19 Sept. 1777. See also SARATOGA, BATTLE OF.

Bemmel, Peter von, German painter: b. Nuremberg, 1685; d. 1754. He was educated by his father, also an artist, and was employed by the Prince Bamberg, Franz Konrad von Stadion in adorning the walls of his palaces. Many of his paintings are preserved at Bamberg and Brunswick. Of the Bemmel family 14 were prominent as artists.

Ben (Hebrew, son), a prepositive syllable found in many Jewish names, as Bendavid, Benasser, etc., which, with the Jews in Germany, has been changed into the German *sohn* (son),

for example, Mendelssohn, Jacobsohn, etc. In Arabic the plural form *Beni* occurs in the names of many tribes, as *Beni Omayyah* and in those of places, as *Beni-Hassan*.

Ben, Beinn, or Bhein, a Gaelic word signifying mountain, and prefixed to the names of many mountains in Scotland north of the Firths of Clyde and Forth, as *Ben Nevis* and *Ben MacDhui*. *Pen*, which occurs in Welsh and Cornish nomenclature is a corresponding term.

Ben Bolt, a noted poem by Thomas Dunn English (1843) set to an old German air. It had been partially forgotten when it was revived by its effective employment in Du Maurier's 'Tribby.'

Ben Hur: A Tale of the Christ, a popular novel, by Lew Wallace, published 1880. The scene of the story is laid in the East, principally in Jerusalem, just after the Christian era. The first part is introductory, and details the coming of the three wise men, Melchior, Kaspar, and Balthasar, to worship the babe born in the manger at Bethlehem. In the course of the narrative, which involves many exciting adventures of Ben Hur, hero, John the Baptist and Jesus of Nazareth are introduced, and Ben Hur is converted to the Christian faith through the miracles of our Lord. The tale has been successfully dramatized.

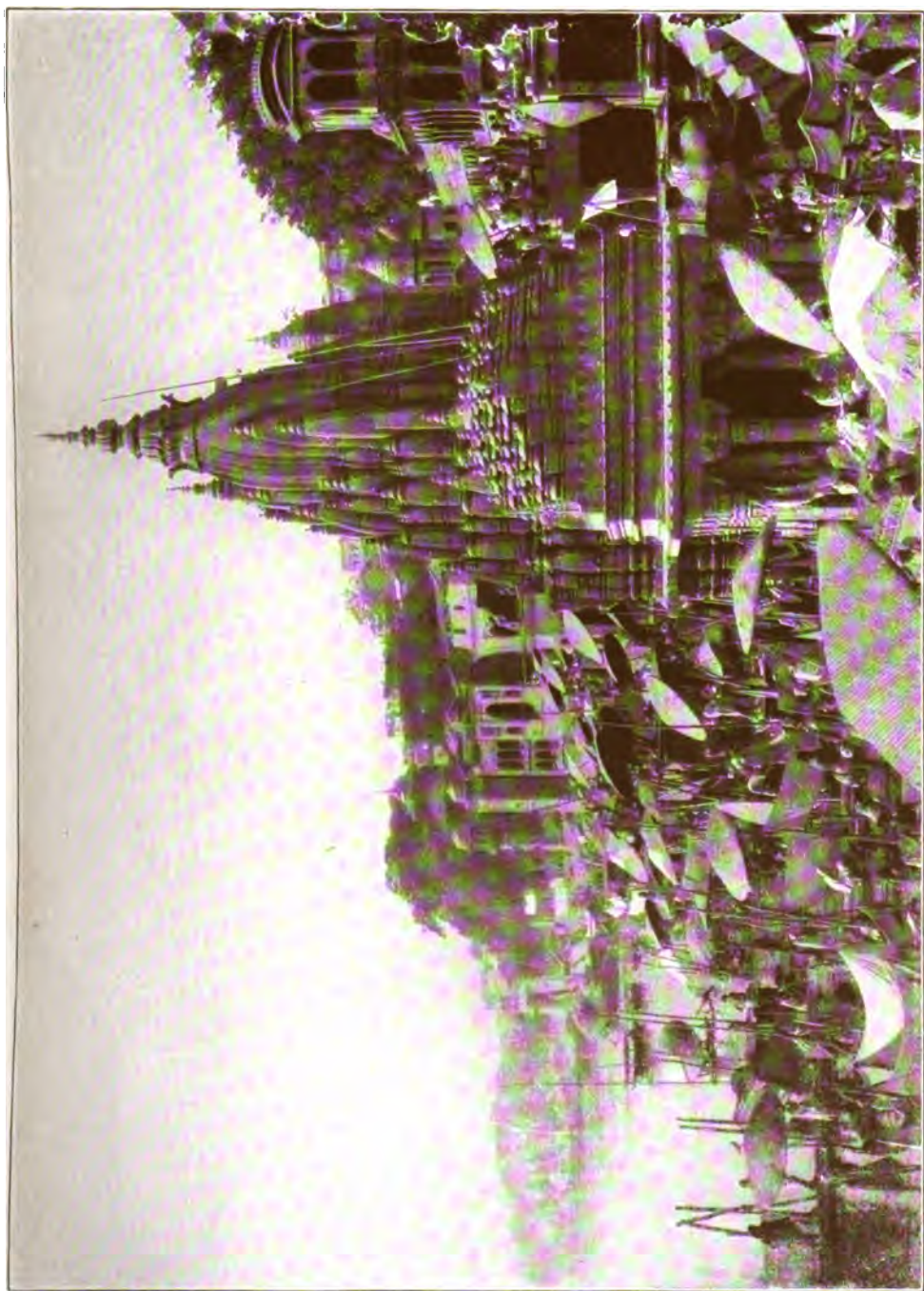
Ben-Lawers, a huge pyramidal mountain of Scotland, Perthshire, on the north bank of Loch Tay, 3,984 feet above the level of the sea, or 4,004 with the cairn at the top. Many rare Alpine mosses and other plants are found on it.

Ben-Ledi, a Scottish mountain, lying northwest of Callander, Perthshire, reaching the height of 2,875 feet above sea-level. It is somewhat difficult of ascent, but gives a splendid view. High up on it there is a small loch. It is mentioned in Scott's 'Lady of the Lake.'

Ben-Lomond, a Scottish mountain at the western extremity of Stirlingshire, on the east shore of Loch Lomond. The ascent is divided into three great stages, and the top has an elevation of 3,192 feet above sea-level. On the southeastern side it presents a sheer precipice of about 2,000 feet. From the hotel at Rowardennan, on the east shore of the loch, to the summit, the distance is four miles. The lower part is well wooded, and the upper affords excellent healthy pasture. It commands a most extensive prospect of the vale of Stirlingshire, the Lothians, the Clyde, Ayrshire, Isle of Man, Hills of Antrim, and all the surrounding highland territory. Like Ben-Lawers this is one of the botanical gardens of the highlands.

Ben-More (the great mountain), a conical hill between Loch Dochart and Loch Voil, western part of Perthshire, among the Braes of Balquhider. It rises to an elevation of 3,843 feet above the level of the sea. Several other hills also bear this name.

Ben-Muich-Dhui, *bën-māk-doo'ë*, or **Ben-Mac-Dhui**, the second highest mountain in Scotland, situated in the southwest corner of Aberdeenshire, on the borders of Banffshire. It is a granitic mass, rising to the height of 4,206 feet, and forms one of a cluster of lofty mountains, among which are *Brae-riach*, *Cairntoul*, *Cairngorm*, *Ben-a-bour*, and *Ben-A'an*. Its upper parts are bare of vegetation. The view from the top includes the Moray Firth, the



BENARES, INDIA.

BEN NEVIS — BENBOW

hills of Caithness and Sutherland, Ben Nevis, Benmore, etc.

Ben Nevis, a Scottish mountain now ascertained to be the most lofty height in Great Britain, is situated in the southwestern extremity of Inverness-shire, immediately east of Fort William and the opening of the Caledonian Canal into Loch Eil. It rises from the brink of the latter piece of water to the height of 4,406 feet. In clear weather a view can be obtained from its summit across nearly the whole of the north of Scotland from sea to sea. It consists principally of a fine brown porphyry, and contains red granite of a beautiful grain. It has some very lofty precipices, and in its fissures the snow remains unmelted, even in the warmest weather. An observatory occupied by a resident staff was established on the top of the mountain by the Scottish Meteorological Society in 1883.

Ben Nut. See BEN, OIL OF.

Ben, Oil of, the expressed oil of the ben-nut, the seed of *Moringa aptera*, the ben or horse-radish tree of India. The oil is inodorous, does not become rancid for many years, and is used by perfumers and watchmakers.

Benaiah, bē-nā'yā, the name of 12 different persons mentioned in the Bible, the most important being a son of Jehoida, a chief priest. He figures as a mighty and valiant warrior who overcame two Moabite champions, slew an Egyptian giant with the giant's own spear, went down into a dry cistern and slew a lion that had fallen in while it was covered with snow, and killed the rebels Adonijah and Joab. He was made commander-in-chief in Joab's place by Solomon.

Benalcazar, bā-nal-kā'thār, **Sebastian de**, Spanish leader, the first conqueror of Popayan, New Granada: b. about the end of the 15th century, at Benalcaz, in Estremadura, Spain; d. 1550. He set out as a common sailor in the train of Pedrarias, the newly appointed governor of Darien, 1514. The ability and daring of young Sebastian gained for him the confidence of Pizarro, who sent him against the Indian leader, Ruminahui. Sebastian was favored at the moment of engagement by a happy accident; the volcano of Cochabamba suffered an eruption. The frightened Peruvian army fled to Quito and Sebastian then possessed himself of the smoking ruins of this city. From here he passed northward and conquered the territory possessed by a chief named Popayan, whose name he preserved to designate the territory over which the former had held sway. Inflamed by the speeches of an Indian captive, who spake strange words about a chief farther north, anointed with gold powder, Benalcazar and his band determined to visit and conquer this *El Dorado*, or chief of gold. After traversing vast forests, in 1534, he arrived at the country which afterward received the name of New Granada. Arrived there, he found himself forestalled by two other Spanish adventurers, or conquistadores. He returned to Popayan, and was made governor of this province by a decree dated 1538. When La Gasca succeeded in supplanting Diego Pizarro, he deprived Sebastian of his governorship.

Benares, bē-nā'rēz, a division in the northwestern provinces of India, with an area of 10,414 square miles, largely made up of rich cultivated flats on each side of the Ganges.

The heat in summer is excessive, but in winter fires are requisite. Garden stuffs, grain of different kinds, flax for oil, and sugar, are the principal objects of cultivation. Rice, for which many parts of the soil seem well adapted, is seldom grown. Muslins, silks, and gauzes, salt, indigo, and opium, are made very extensively. The principal town is Benares. Pop. about 5,368,600, and the Hindus greatly outnumbering the Mussulmans.

Benares (in Sanskrit, *Vārāṇasī*), a town in Hindustan, northwest provinces, in the division of the same name, on the left bank of the Ganges, from which it rises like an amphitheatre, presenting a splendid panorama of temples, mosques, palaces, and other buildings, with their domes, minarets, etc. Fine ghauts lead down to the river. It is built of freestone, and contains many handsome and highly decorated houses, but the height of the houses and narrowness of the streets give it all the usual inconveniences of an Asiatic town. Kasi, the Splendid, as the Hindus commonly call it, is one of the most sacred places of pilgrimage in all India, being the headquarters of the Hindu religion. To die at Benares is the greatest happiness for a Hindu, because he is then sure of immediate admission into heaven. The number of pious foundations and temples is exceedingly great. There is a continual influx of wealthy pilgrims into the city, and many of the Hindu princes have a town residence here. The principal temple, called Bisheswar, is dedicated to Siva. Aurungzebe built a splendid mosque on the highest ground in the city, and it is the most prominent object from the river side. At the end of the 17th century an observatory was erected in this city by one of the rajahs, which still exists. One of the temples has a great number of sacred monkeys attached to it. Altogether there are about 1,500 Hindu temples. Among the municipal structures are the government college, hospitals, town-hall, asylums, swimming baths, and waterworks. Benares carries on a large trade in the produce of the district and in English goods, and manufactures silks, shawls, embroidered cloth, jewelry, etc. The merchants and bankers are numerous and wealthy. There are few English inhabitants, except the government officers, and the members of the various missions. Kasi was ceded to the East India Company by the Nabob of Oude in 1775. During the mutiny of 1857 a serious outbreak occurred here. Pop. about 204,000. See Sherring, 'Sacred City of the Hindus' (1869).

Benaventé, bā-nā-vēn'tā, a town of Spain, in the province of Zamora, on the western bank of the Esla, 34 miles north from Zamora. It is overlooked by a huge, half-ruined castle, and is now a dull and poverty-stricken place, built chiefly of mud cottages. It was here that Moore's retreat commenced, 28 Dec. 1808.

Benbow, John, famous English admiral: b. Shrewsbury, England, 1653; d. Jamaica, 4 Nov. 1702. After serving for some time in the navy he entered the merchant service, and fought so desperately against a pirate from Sallee, in one of his trips to the Mediterranean, about the year 1686, as to beat her off, though greatly his superior in men and metal. He re-entered the navy after the Revolution, and was employed in protecting the English trade in the channel, which he did with great effect. His valor and

activity secured him the confidence of the nation, and he was soon promoted to the rank of rear-admiral, and charged with operations against Dunkirk and the French coasts. In 1698 he was sent to put down the pirates in the West Indies, and not long after returning, he again sailed to the West Indies with a small fleet, having accepted a command previously declined by several of his seniors, from the supposed superiority of the enemy's force in that quarter. In August 1702, he fell in with the French fleet under Du Casse, and for five days maintained a running fight with them, when he at length succeeded in bringing the enemy's sternmost ship to close quarters. In the heat of the action a chain-shot carried away one of his legs, and he was taken below; but the moment the dressing had been applied to the wound he caused himself to be brought again on deck, and continued the action. At this critical instant, being most disgracefully abandoned by several of the captains under his command, who signed a paper expressing their opinion that "nothing more was to be done," the whole fleet effected its escape. Benbow, on his return to Jamaica, brought the delinquents to a court-martial, by which two of them were convicted of cowardice and disobedience of orders, and condemned to be shot; which sentence, on their arrival in England, was carried into execution at Plymouth.

Bench, in law, the seat which judges or magistrates occupy officially in a court of justice; also the judges or magistrates sitting together to try cases. The court of common pleas in England was formerly called *Bancus*, the Bench, as distinguished from *Bancus Regis*, the King's Bench. It was also called *Communis Bancus*, the Common Bench, and this title is still retained by the reporters of the decisions in the court of common pleas. Mention is made in the Magna Charta "*de justiciariis nostris de Banco*," which all men know to be the justices of the court of common pleas, commonly called the Common Bench, or the Bench. Viner, Abr. Courts (n. 2).

Bench-mark, a mark placed upon some permanent object, as a stone or wall, for use in tidal observations and leveling surveys. Its position above the zero of the tide-gauge or other datum level is made a matter of record and any level once established may be readily ascertained at a future period. See also **LEVELING**.

Bench Warrant, a warrant issued by the court before which an indictment has been found to arrest the accused, that he may appear and find bail for his appearance at the trial. Where a bench warrant is directed to the sheriff it cannot be executed by one having only verbal authority from the sheriff, and such arrest does not discharge the recognizance. A bench warrant is defective which does not direct that the party shall be brought before some judge or justice.

Benchers, in England, senior members of the Inns of Court, who have the entire management of their respective inns, the power of punishing barristers guilty of misconduct, and the right to admit or reject candidates to the bar. See also **INNS OF COURT**.

Bencoolen, bën-koo'lën (Dutch, *Benckoe-len*), a seaport of Sumatra, on the southwest coast; lon. 102° 19' E.; lat. 3° 47' 36" S. The English settled here in 1685, and in 1690 the East India Company built a fort here, calling it Fort York. In 1825 Bencoolen was yielded up to the Dutch in exchange for the settlements on the Malay Peninsula. A convenient river on its northwest side conveys pepper out of the inland country; but there is great inconvenience in shipping it, by reason of a dangerous bar at the river's mouth. The place, which is almost two miles in compass, is known at sea by a high, slender mountain, which rises in the country 20 miles beyond it, called the Sugar Loaf. It is inhabited by a mixed population. The medium heat throughout the year is from 81° to 82°. Pepper is the chief produce of the adjacent country, which is mountainous and woody. The place is unhealthy and subject to earthquakes; storms are frequent. Pop. 6,000.

Benczur, bën'tsoor, *Gyula (Julius)*, Hungarian artist: b. Nyirgyháza, 1844. He was made professor at the Academy of Munich in 1880 and was subsequently director of the Academy of Budapest. His paintings, which are of the School of Piloty, are noted for their splendid coloring. Among the most celebrated are 'Farewell of Ladislav Hunyady' (1867); 'Arrest of Rákóczy' (1701); 'Louis XV. in the Boudoir of Dubarry'; 'Family of Louis XVI. during the Assault on Versailles' (1872), owned by D. O. Mills, New York; 'Baptism of St. Stephen' (1875); 'Bacchanti' (1881); 'The Reconquest' of Buda by Charles of Lorraine' (1888).

Bend, in heraldry, one of the nine honorable ordinaries, containing a third part of the field when charged, and a fifth when plain, made by two lines drawn diagonally across the shield from the dexter chief to the sinister base point. The bend sinister differs only by crossing in the opposite direction, diagonally from the sinister chief to the dexter base. It indicates illegitimacy.

Ben'da, Franz, German violinist: b. Jungbunzlau, Bohemia, 1709; d. Potsdam, 1786. He exhibited, while a boy, a great desire to learn the violin, which he could gratify in no other way than by joining a band of strolling musicians. He found means, however, to acquire an extraordinary mastery of the instrument, and in 1732 entered the service of Frederick the Great, then prince-royal, with whom he remained the rest of his long life. He founded a school of violinists, whose method of playing was entirely original and quite effective. He also published some excellent solos for the violin.

Benda, Georg, German musician, the most distinguished of a notable musical family: b. Jungbunzlau, Bohemia, 1721; d. Köstritz, 1795. He was bandmaster to the Duke of Gotha (1748-87), and in this period produced several operas and cantatas, such as 'Arjadne auf Naxos' and 'Medea.'

Bendalou, Paul, a soldier of the American Revolutionary army: b. Montauban, France, 15 Aug. 1755; d. Baltimore, Maryland, 10 Dec. 1826. In October 1776 he embarked at Bordeaux for the United States, as a volunteer in the cause of liberty, and, on reaching the headquarters of Washington, received a lieutenant's commission. Transferred to the command of

Pulaski, he was captain of the first company in his famous legion at the siege of Savannah. There he carried off the field the body of the generous Pole, and preserved, also, the standard of the legion, which had been wrought and presented by the wives and daughters of Maryland. He was quartermaster-general, with the rank of colonel, in the Maryland militia during the War of 1812, and for many years United States marshal for the circuit and district courts of Maryland, his official conduct, from first to last, being marked with exactness and integrity.

Bendemann, bën'dë-man, Eduard, German painter: b. Berlin, 3 Dec. 1811; d. Düsseldorf, 27 Dec. 1889. As early as 1832 his great picture of the 'Captive Jews' was exhibited at Berlin, and in 1837 he gained the gold medal at Paris. In 1838 he was appointed professor of the Academy of Art at Dresden. Here he was intrusted with the execution of the larger frescoes in the palace, and on these his fame chiefly depends. In 1858 he succeeded his father-in-law as director of the Düsseldorf Academy, a post which he held until 1867. He afterward produced several large canvases and frescoes, some of which are among his best works. Tytler, 'Modern Painters and their Paintings' (1899).

Bender, Louis Prosper, Canadian-American physician and author: b. Quebec, 30 July 1844. He graduated at McGill University in 1865, after having interrupted his studies by a service in the medical department of the Union army during a portion of the American Civil War. In 1884 he settled in Boston, Mass., where he established himself in homoeopathic practice. His writings include 'Literary Sheaves,' or 'La Littérature au Canada-Français' (1881); 'Old and New Canada, 1753-1844,' 'Historic Scenes and Social Pictures, or the Life of Joseph François Perrault' (1882); etc. He has frequently contributed to American magazines.

Bender, a city of Russia, in the government of Bessarabia. It is situated on the Dniester, and is a straggling place, chiefly consisting of low houses and mere huts. It formerly possessed a strong fortress, but this was dismantled in 1897. Its commerce is important. After being several times taken from the Turks by the Russians, it has belonged to Russia since the Peace of Bucharest, in 1812.

Bendigo, formerly SANDHURST, Australia, a city in Bendigo County, Victoria, on Bendigo Creek, fully 100 miles north-northwest of Melbourne, with which it has direct railway communication. It is one of the chief cities in the colony and an important railway centre. Along one side of its main street (Pall Mall) there are fine buildings of brick and stone, and facing these, in Rosalind Park, are the elegant government buildings and the law courts, which together cost nearly £80,000. Other buildings worthy of mention are the handsome town-hall, mechanics' institute, with library and school of mines; free library; temperance, masonic, and other halls; hospital, benevolent asylum; some fine banks; Anglican, Wesleyan, Presbyterian, and other churches; Roman Catholic Cathedral, in course of erection; art gallery, jail, state and other schools, etc. The public parks comprise, besides the Rosalind Park, the fine Botanic Gardens and two others largely used for sports. The streets are lighted by gas and electricity,

and there is an excellent water-supply from large reservoirs near the town. The chief industry of the district is gold-mining, which gives employment to 5,000 miners. Other important industries are brewing, iron-founding, stone-cutting, granite-polishing, tanning, and the manufacture of pottery, bricks, tiles, cordials, etc. Agriculture and viti-culture are carried on in the district, and there is a trade in wine and fruits. Bendigo was founded at the time of the gold discovery in 1851. Nearly £70,000,000 worth of gold has been obtained here, much of it from quartz reefs. Pop. about 35,000. See Mackay, 'History of Bendigo' (1901).

Bendire, bën-dë're, Charles Emil, German-American military officer and ornithologist: b. Darmstadt, Germany, 27 April 1836; d. 1897. He came to the United States in 1852, and entering the army in 1854, served through the Civil War, becoming a captain in the 1st Cavalry. After the war he was transferred to the West, and was retired 24 April 1886. During his stay in the West he applied himself to the study of ornithology, and collected a vast amount of material in various branches of natural history. In 1870 he began to collect the eggs of North American birds, which finally numbered more than 8,000 specimens, and this collection he presented to the United States National Museum. He is the author of 'The Life Histories of North American Birds, with Special Reference to their Breeding Habits and Eggs.'

Bendzin, bënd'zen, the capital of a district in Russian Poland, in the government of Piotrkow, situated on the Black Przemsza, on a branch of the Warsaw & Vienna R.R. Its chief industry is the zinc works, under government control; there are also coal mines in the vicinity. Pop. 21,200.

Bene, bën'e, the plant that furnishes oil of sesamum.

Ben'edek, Ludwig von, Austrian military officer: b. Odenburg, Hungary, 14 July 1804; d. Gratz, 27 April 1881. He fought against the Italians in 1848, and afterward against the Hungarian patriots. He distinguished himself at Solferino in the campaign of 1859; and in the war with Prussia in 1866 commanded the Austrian army till after his defeat at Sadowa, when he was superseded.

Benedetti, bā-nē-dët'te, Vincent (COUNT DE), French diplomatist of Italian extraction: b. Bastia, Corsica, 29 April 1817; d. Paris, 28 March 1900. He was educated for public service, held consulates in Cairo, Palermo, Malta, and Tunis; and as secretary of the Congress of Paris in 1856, drew up the protocols of the treaty then agreed upon. In 1861 he was appointed ambassador to Italy, and in 1864 to Prussia. In 1870 great excitement was aroused throughout Europe by the publication in the London *Times* of the alleged draft of a secret treaty between France and Prussia. The authenticity of the document was not denied. The French government declared that although Benedetti had written the document, he had done so at the dictation of Bismarck. At the same time Benedetti was under orders to protest against the candidature of Prince Leopold of the house of Hohenzollern for the crown of Spain. He became so importunate in trying to carry out these orders that he was forbidden to seek further interviews with King William. The refusal of

.BENEDETTO — BENEDICT

the king to again receive Benedetti gave great offense in France, and was made a pretext for declaring war within a few days. After the fall of the empire, Benedetti withdrew from public life. In 1871 he published a pamphlet charging Bismarck with the whole responsibility of the secret treaty, to which the latter made a vigorous reply. Benedetti was author of 'Ma Mission en Prusse' (1871); and 'Studies in Diplomacy,' an English translation of which appeared in 1895.

Benedetto, bā-nā-dēt'tō, da Majano, Italian architect and sculptor: b. Florence in 1442; d. there, 1498. He began his career as a worker in wooden mosaic; and with his brothers, Giovanni and Giuliana, he executed the 'Madonna dell Ulivo.' His own work, represented in the 'Madonna,' far excels the work of his brothers. His most celebrated work as an architect was the Palazzo Strozzi, began in 1489. In 1490, he carved the busts of Giotto and Squarcilupo, in the Duomo at Florence. In 1491, the monument to Filippo Strozzi was erected in Santa Maria Novella, a work which Strozzi had commissioned Benedetto to make before his death. It is the *chef-d'œuvre* of the sculptor, and one of the most notable sculptures of the 15th century.

Benedicite, bèn-ē-dis'ī-te, the song of the 'Three Children' in the fiery furnace, as given in the Apocrypha and the Septuagint version of Daniel, which is a part of the Roman Breviary in the office of lauds; it is also a part of the Anglican morning prayer, to be used when the Te Deum is not sung, usually from Septuagesima to Easter and during Advent.

Benedick, sometimes spelled **Benedict**, a married man; from the Latin *benedictus* (a happy man), and a skit on the order of St. Benedict, famous for their ascetic habits, and, of course, rigidly bound to celibacy. Shakespeare, in 'Much Ado About Nothing,' avails himself of this joke in making Benedick, the young lord of Padua, "rail against marriage," but afterward marry Beatrice, with whom he falls in love.

Benedict, Saint, the founder of the first religious order in the West: b. Norcia, Italy, 480; d. 21 March 543. In the 14th year of his age he retired to a cavern situated in the desert of Subiaco, 40 miles from Rome, and in 515 drew up a rule for his monks, which was first introduced into the monastery on Monte Cassino, in the neighborhood of Naples, founded by him (529) in a grove of Apollo after the temple had been demolished. This gradually became the rule of all the western monks. The abbots of Monte Cassino afterward acquired episcopal jurisdiction, and a certain patriarchal authority over the whole order. Benedict, with the intention of banishing idleness, prescribed, in addition to the work of God (as he called prayer and the reading of religious writings), the instruction of youth in reading, writing, and ciphering, in the doctrines of Christianity, in manual labors (including mechanic arts of every kind), and in the management of the monastery. With regard to dress and food, the rule was severe but not extravagant. Benedict caused a library to be founded, for which the aged and infirm brethren (*ordo scriptorius*) were obliged to copy manuscripts. By this means he contributed to preserve the literary remains of antiquity from

ruin; for though he had in view only the copying of religious writings, yet the practice was afterward extended to classical works of every kind; and the learned world is indebted for the preservation of great literary treasures to the order of St. Benedict.

Bibliography.—Wölffr, 'B. von Nursia und seine Mönchsregel' (1895); Henderson, 'Historical Documents of the Middle Ages,' pp. 274-314 (1892); 'Die historische Voraussetzungen der Regel des heiligen Benedict von Nursia' (1895); Doyle, 'Teachings of Saint Benedict' (1887). See BENEDICTINES.

Benedict, the name of fourteen Popes.

Benedict I., succeeded John III. 575; d. 578, and was himself succeeded by Pelagius II.

Benedict II., succeeded Leo II. 684; d. 685, and was succeeded by John V.

Benedict III., succeeded Leo IV. 855. During his pontificate, the Saracens were ravaging Apulia and Campania. D. 858, and was succeeded by Nicholas I.

Benedict IV., succeeded John IX. about 900. He crowned Louis, son of Boson, king of Italy. D. 903, and was succeeded by Leo V.

Benedict V., succeeded John XII. 964, and was appointed by the Romans in opposition to Leo VIII. The Emperor Otho, supporter of Leo, appeared before Rome with an army, reduced the city to famine, and a new assembly of the clergy declared to be null the election of Benedict, who was exiled. D. 965.

Benedict VI., succeeded John XIII. 972. After the death of the Emperor Otho I., the Romans imprisoned Benedict, who was strangled in the castle of St. Angelo, in 974. Owing to the mistake of later chroniclers in confusing Dominus Papa with a supposed proper name, Donus II. appears in many lists of the Popes between Benedict VI. and Benedict VII. Geisebrecht, in his 'Year-Book of the German Kingdom under Otho II.,' has clearly shown that no such Pope as Donus II. ever existed.

Benedict VII., of the family of Conti, elected in 975. During his pontificate, the Emperor Otho II. came repeatedly to Rome, where he died in 984. Benedict died about the same time, and was succeeded by John XIV.

Benedict VIII., of the same family, succeeded Sergius IV., in 1012. In 1016, the Saracens from Sardinia having landed on the coast of Tuscany, Benedict attacked and defeated them. He crowned the Emperor Henry II., and his wife, in the Church of St. Peter: D. 1024, and was succeeded by his brother, John XIX.

Benedict IX., a relative of the two preceding Popes, succeeded John XIX. in 1034. He was then very young, some say only 18 years old. He was deposed in 1048, and died in a convent in 1054, being succeeded by Leo IX.:

Benedict X. was elected by a faction after the death of Stephen IX., in 1058; but the Council of Siena nominated Nicholas II. Benedict did not submit till the following year, when Nicholas came into Rome. D. 1059.

Benedict XI., a Dominican, succeeded Boniface VIII., in 1303. Contemporary historians speak highly of his character and virtues. He died 1304, and was succeeded by Clement V.

BENEDICT — BENEDICT BISCOP

Benedict XII., Jacques Fournier, a native of France, succeeded John XXII., in 1334, the Popes residing then at Avignon. He put a stop to many abuses in the distribution of ecclesiastical patronage, enforced discipline among the monastic orders, and insisted that temporal rulers should observe their compacts with the Holy See. D. 1342, and was succeeded by Clement VI.

Benedict XIII., Cardinal Orsini, succeeded Innocent XIII., in 1724, but it was with difficulty that he could be made to accept the pontificate. Benedict lived with the greatest frugality, and has been called more a monk than a Pope. He managed, however, to transact an extraordinary number of affairs. His great fault was his implicit confidence in Cardinal Coscia, who much abused it. D. February 1731. His works were published in 1728, in three volumes folio. He was succeeded by Clement XII.

Benedict XIV., Prospero Lambertini: b. Bologna, 1675; d. 3 May 1758. He applied himself with success to the canon and civil law, and became advocate to the consistory at Rome. Afterward he was appointed *promotor fidei*, and wrote a valuable work on the 'Ceremonies used in Beatifications' (1734). He was passionately fond of learning, of historical researches, and monuments of art, and also associated with the distinguished men of his time; among others with Father Montfaucon, who said of him, "Benedict has two souls; one for science and the other for society." He also made himself familiar with the best poetical works, whereby his mind became elevated and his style animated. Benedict XIII. made him, in 1727, bishop of Ancona; in 1728 cardinal, and in 1732 archbishop of Bologna. In every station he displayed great talents, and fulfilled his duties with the most conscientious zeal. He opposed fanaticism even at the risk of his own safety, defended the oppressed, and expressed himself with the greatest frankness to Clement XII. without losing his favor. When, after the death of Clement XII. in 1740, the election of a new Pope in the conclave was retarded by the intrigues of Cardinal Tencin, and the cardinals could not agree, Lambertini, with his usual good nature, said to them, "If you want a saint, take Gotti; if a politician, Aldobrandi; if a good old man, myself." These words, thrown out in a humorous manner, operated on the conclave like inspiration, and Lambertini, under the name of Benedict XIV., ascended the papal throne. His choice of the ministers and friends whom he assembled around him does the greatest honor to his judgment. The condition of the Church and of the Roman court had not escaped his penetration. Since the Reformation princes no longer trembled at the thunders of the Vatican. The power of the Popes in temporal affairs had notably declined, and Lambertini knew that respect for the papal authority could be maintained only by a wise moderation. He constantly regulated his measures by this principle, and thus succeeded, even in difficult circumstances, in satisfying not only the Catholic but even the Protestant princes. The sciences were a special object of his care. He established academies at Rome; promoted the prosperity of the academy at Bologna; caused a degree of the meridian to be measured; the obelisk to be erected in the Campus Martius; the

Church of St. Marcellino to be built after a plan projected by himself; the beautiful pictures in St. Peter's to be executed in mosaic; the best English and French works to be translated into Italian; and commanded a catalogue of the manuscripts contained in the Vatican library (the number of which he had enlarged to 3,300) to be printed. His government of the papal states did equal honor to his wisdom. He enacted severe laws against usury, favored commercial liberty, and diminished the number of holidays. His piety was sincere, yet enlightened and forbearing. He strove to maintain purity of doctrine and of morals, giving in his own character the most praiseworthy example. The sole reproach brought against him by the Romans was that he wrote too much and governed too little. His works compose, in the Venice edition, 16 volumes folio. The most important of his works is that on the Synods, in which we recognize the great canonist.

Benedict Biscop, Anglo-Saxon ecclesiastic: b. of a noble Northumbrian family in 628 or 629; d. Wearmouth, 12 Jan. 690. He spent the first years of his life at court, but at the age of 25 he relinquished this manner of life and accompanied Wilfrid on a pilgrimage to Rome in 653. Here he lived for more than 10 years, when he returned to England; but not very long after again went to Rome, on a mission intrusted to him by Alchfrid, king of Northumbria. On his way back he stopped at Lerins in Provence, where he remained for the next two years, making himself acquainted with the rules of monastic life in the monastery of Lerins, of which he had become a member. In 668 he made a third journey to Rome, where he arrived just at the time when the Pope was about to appoint some one to fill the see of Canterbury, which was then vacant. Having fixed upon Theodore, a Cilician monk, he requested Benedict to accompany him to England to assist him in securing the favor of the Anglo-Saxons, which as a foreigner he might have difficulty in doing. Benedict agreed to do this, and was presented with the abbacy of St. Peter's in Canterbury; but at the end of two years he resigned the abbacy and again went to Rome. On this occasion he returned to England with a valuable collection of books and a large number of relics, which he had accumulated during his previous visits to Rome. With these he proceeded first to Wessex with the intention of remaining there, but finding that the king of Wessex was dead he turned northward to his native Northumbria, and there he was fortunate enough to secure the favor of King Egfrid. From him he received a donation of land at the mouth of the Wear, on which he founded the monastery of Wearmouth. In 678 he made his fourth journey to Rome, and brought back additional stores of books for his library, as well as pictures, images, glass for windows, etc., with which he decorated the monastery he had founded. He was now presented by Egfrid with a further grant of land on the other side of the Wear, where he founded another monastery, that of Jarrow, dependent on the monastery at Wearmouth. During the remainder of his life he continued to live in the latter monastery, except on the occasion of a fifth voyage to Rome, made in 685, and from which he derived as before valuable additions to his various collections. It is chiefly by these collections that his services to learning are to be

BENEDICT — BENEDICTINES

estimated, and there can be no doubt that his great pupil, the "Venerable Bede," who was a monk in the monastery of Jarrow, was immensely indebted to them for the learning he acquired.

Benedict, David, American Baptist clergyman and historian: b. Norwalk, Conn., 10 Oct. 1779; d. 1874. He was pastor at Pawtucket, R. I., for 25 years, and preached till over 90 years of age. Among his chief works were 'History of All Religions'; 'Fifty Years Among the Baptists,' 'History of the Donatists.'

Benedict, Frank Lee, American novelist: b. Alexander, N. Y., 6 July 1834. Among his numerous novels are 'John Worthington's Name'; 'Miss Van Kortland' (1870); 'Her Friend Lawrence' (1879); 'The Price She Paid' (1883). A collection of his verses 'The Shadow Worshipper and Other Poems' appeared in 1857.

Benedict, Sir Julius, German-English pianist and composer: b. Stuttgart, 1804; d. London, 1885. In 1821 he went to Dresden to study under Weber, and two years later became conductor at a Vienna theatre. His first opera, 'Giacinta ed Ernesto,' was produced in Naples in 1829 without success. He took up his residence in England in 1835, and was knighted in 1871. He was for many years conductor at the Norwich festival, and during a number of seasons acted as operatic conductor in London, both for English and Italian opera. His principal works are the operas, 'The Gipsy's Warning' (1838); 'The Bride of Venice' (1843), 'The Crusaders' (1846); 'The Lily of Killarney' (1862), founded on Boucicault's 'Colleen Bawn,' and 'The Bride of Song' (1864); the cantatas, 'Undine' (1860) and 'St. Cecilia' (1866); the fine oratorio 'St. Peter' (1870); and the cantata 'Graziella' (1882).

Benedict-Beuern, bē'nē-dīkt-boi'ēr'n, formerly an abbey situated in the Bavarian circle of the Iser, about 40 miles distant from the city of Munich, on the descent of the mountains toward the Tyrol. The convent was founded as early as 740, and was abolished in 1803. The fine abbey church still remains. The Bavarian government has here a depot for army horses, and a veterinary establishment; and there is also a residence for invalids.

Benedict'tine, a liqueur originally prepared by the Benedictine monks of the abbey of Fécamp, in Normandy, consisting of spirit (fine brandy) containing an infusion of the juices of plants, and said to possess digestive, antispasmodic, and other virtues, and to have prophylactic efficacy in epidemics. It somewhat resembles chartreuse and has been made in the same way since 1510. See LIQUEUR.

Benedictines. From the 6th to the 10th century almost all the monks in the West might be so called, because they followed the rule of St. Benedict of Norcia. The rules which at that time the monasteries in Spain and France received from their bishops, as well as the rule of the Irish St. Columba, were essentially the same as those of St. Benedict; and in the progress of his order the monasteries in Spain and France, as well as those of the order of Columba, united themselves with it. Monte Cassino, the magnificent primitive monastery of the Benedictines, became the model of all others. At that time the monasteries, having no common supe-

riors, were under the immediate control of the bishops in their respective dioceses, and differed from one another in many qualifications of the primitive rule. Not even the color of their dress was the same. The disciples of Columba wore white garments like the first Benedictine nuns, who originated in France in the 6th century. After the unions which took place at a later period, all the members of this order wore black, as the founder is said to have done. The decline of monastic discipline after the 8th century occasioned the reforms of Benedict of Aniana in France, the renewed inculcation of the old rule, and the adoption of new ordinances suited to the times, by the Council of Aix-la-Chapelle (817), as well as the particular rules and fraternities of the celebrated monasteries in France, Germany, and England, which in those barbarous times became seats of civilization and finally the institution of the Cluniacs, a new branch of the Benedictines, which proceeded from the convent of Clugny in Burgundy, founded in the year 910. The Benedictine monasteries, in the Middle Ages, were often asylums in which science took refuge and found protection. In place of the discordant and uncertain rules which had hitherto existed, the Cluniacs made fixed regulations concerning the hours of worship, the obedience, discipline, and common government of all the monasteries belonging to their order, which were soon imitated in all Europe. In the 12th century their order contained 2,000 monasteries, whose luxury frequently called for reforms, and finally became the chief cause of their decline. The remains of the Cluniacs united themselves in the 17th century, under the patronage of Richelieu, with the Benedictine fraternities of St. Vannes and St. Maurus, the latter of which, founded in 1618, had in the beginning of the 18th century 180 abbeys and priories in France, and acquired by means of its learned members, such as Mabillon, Montfaucon, and Martène, merited distinction. To this family belong those new orders established on the foundation and observing the rule of St. Benedict, which have originated since the 11th century, and are distinguished from the proper Benedictines by their dress, names, and particular regulations; for example, the Camaldulians, the monks of Valombrosa, the Sylvestrians, the Grandmontenses, the Carthusians, the Cœlestines, the Cistercians, and Bernardines, the Trappists, and the monks of Fontevraud. The Benedictine monasteries never constituted one society, constitutionally regulated and governed under an aristocratical or monarchical form; on the contrary, a great many monasteries which descended from the old Benedictines were compelled by the Council of Trent to unite themselves gradually into particular fraternities. Among these the Benedictines of Monte Cassino, of Monte Vergine, and Monte Oliveto (who called themselves *Olivetans*) in Italy and Sicily; those of Valladolid and Montserrat in Spain; those of Hirschau and Fulda in Germany, and that of Mülk in Austria, deserve particular notice on account of the extent of their possessions, the magnificence of their churches, and the mildness of their rules. To the fraternity of Mülk (or Melk), which still exists, but accommodated to the spirit of the times, the rest of the Benedictine convents in Austria are joined. Many of the nunneries of this order are reserved for the

nobility, because the places in them are equal to the most lucrative benefices. During the first French revolution the monasteries of the Benedictines along with all other monastic orders were abolished; but the Benedictines have since partially re-established themselves in France. In England the Benedictines were an important body at the dissolution of the monasteries, having then 186 abbeys, priories, and nunneries, besides many smaller houses. At present there are eight Benedictine abbeys in England, besides an extensive establishment at Fort Augustus in Scotland, comprising an abbey and college. In the United States there are 13 abbots, 545 priests, 133 clerics, and 345 lay brothers in the order. The Benedictines have charge of 16 colleges in the United States.

Bibliography.—Chateaubriand, 'Monks of the West'; Taunton, 'English Black Monks of Saint Benedict'; Digby, 'Ages of Faith.'

Benediction, the act of blessing, of wishing to a person or thing the grace of God. It has always existed as a custom among Jews and Christians. The Jewish priests bestowed benedictions upon the people when they remained obedient to the law, and maledictions when they neglected it. In the Catholic Church the term is generally applied to the religious public service at which the priest makes the sign of the cross over the congregation with the ostensorium containing the consecrated Host. The Anglo-Saxon term "blessing" is now commonly used to express the benediction invoked with prayer, sign of the cross, and holy water upon religious articles such as prayer-books, holy pictures, rosary-beads, etc. In Protestant churches the benediction is usually given in words similar to those prescribed by Moses to Aaron. It is often accompanied with laying on of hands, especially in the celebration of marriages, the ordination of pastors, the confirmation of converts, and the baptism of children.

Benedic'tus, the song of Zacharias used in the Roman breviary at lauds and also in the Anglican morning service.

Benedix, bā'ně-diks, Roderich, German playwright and actor: b. Leipsic, 21 Jan. 1811; d. 26 Sept. 1873. In 1831, he became an actor, and in 1838 staged his first play 'Das Bemuste Haupt.' He was connected with the management of several theatres at Cologne and Frankfurt-on-the-Main. Among his plays are 'Dr. Wespe'; 'Die Hochzeitreise'; 'Die Männerfeinde'; 'Der Liebesbrief'; 'Der Prozess'; and 'Die Sonntagsjäger.' His dramatic works were collected and published at Leipsic in 27 volumes. He has written also concerning German folklore.

Benefice (Lat. *beneficium*), an ecclesiastical living, originally including every species of preferment, as well as those to which dignities and offices were attached, namely, bishoprics, deaconries, and prebends, as the lesser sort, namely, rectories, vicarages, perpetual curacies, and endowed chaplainries; but in its popular acceptance it includes only the latter class, and the distinction is recognized in recent acts of Parliament. The name is derived from the *beneficium* of the Romans, a grant of any kind to a subject by the sovereign. It was afterward the designation of a grant of land by any large proprietor to a retainer or follower as a reward of services, being the same that later was de-

nominated a *fief* or *fee*, the essential incident of which was perpetuity, that is to say, it was a permanent stipendiary estate held of a superior, and usually subject to some condition indicating vassalage. The principle of the feudal tenure was applied, in the Middle Ages, to ecclesiastical benefices to this extent, that they were held of the Pope, as a superior lord, though these benefices had not the hereditary character of a fee, so far as respected the office or dignity connected therewith, and the lands or emolument conferred by a grant were usually attached to such office or dignity, and on the death of the incumbent, reverted to the ecclesiastical superior who was entitled to appoint a successor. This, at all events, was the claim of the Popes, though it was the subject of contest between them and the principal European sovereigns.

Benefit of Clergy, in English criminal law, the *privilegium clericale*, exemption of the clergy from penalties imposed by law for certain crimes. This privilege no longer exists, but it was for many centuries an important element in the administration of criminal law, and still is a curious and instructive part of the history of England. The origin of this privilege was a claim made by the ecclesiastics at an early period for the entire exemption of their order from the jurisdiction of the common law courts. In scattered instances the right was recognized in the colonies of Carolina and Virginia. An Act of Congress passed 30 April 1790 provided that benefit of clergy shall not be allowed for any offenses punishable by death. See Pollock and Maitland, 'History of English Law' (2d ed., 1899).

Beneke, bā'ně-kě, Friedrich Eduard, German philosopher: b. Berlin, 17 Feb. 1798; disappeared 1 March 1854; found drowned in a canal at Charlottenburg, 4 June 1856. After serving as a volunteer in the campaign of 1815, he studied theology and philosophy at Halle and Berlin, giving special attention to the English philosophers. In 1820 he lectured in the University of Berlin as a private teacher, but the continuance of his lectures was forbidden in 1822, on account of his departure from the philosophical principles of Hegel. He then taught for a few years in Göttingen, but, returning to Berlin in 1827, received permission to lecture in the university, in which he was elected extraordinary professor of philosophy after Hegel's death, in 1832. The starting point of his system is, that philosophy must be founded upon a strict and careful examination of the phenomena of consciousness. He thus adopts, in mental philosophy, the method observed by Bacon in the natural sciences, and his system is described as an empirical psychology. He was a voluminous writer and among his chief works 'Erfahrungs-seelenlehre, als Grundlage alles Wissens, in ihren Hauptzügen dargelegt' (1820); 'Neue Grundlegungen zur Metaphysik' (1822); 'Pragmatische Psychologie, oder Seelenlehre in der Anwendung auf das Leben' (1850).

Benet, Stephen Vincent, American military officer: b. St. Augustine, Fla., 22 Jan. 1827; d. 22 Jan. 1895. He was graduated at the United States Military Academy in 1849, and assigned to the Ordnance Department; was assistant professor of ethics and law at the Military Academy in 1859-61; instructor of ordnance in 1861-4; became brigadier-general and chief of

BENEVENTO — BENGAL

ordnance in 1874; and was retired in 1891. He was author of 'Military Law and the Practice of Courts Martial' (1862); 'Electro-Ballistic Machines and the Schultze Chronoscope' (1866); and a translation from the French of Jomini's 'The Campaign of Waterloo.'

Benevento, a province of Italy, with an area of 680 square miles, and an archiepiscopal city. The surface of the province is hilly but the soil fertile in corn, fruit, and pasture. Game is very abundant, and cattle, grain, wine, oranges, and dead game are exported. Benevento was originally called Maleventum; but this was changed to Beneventum by the Romans when they founded a colony here after the defeat of Pyrrhus. Before it came into the hands of the Romans it belonged to the country of the Samnites. The Lombards in 571 made it a dukedom, which, long after the extinction of the Lombard kingdom, remained independent. At a later period it fell into the hands of the Saracens and Normans. The city, however, was not conquered by the latter, because Henry III. had given it to the Pope, Leo IX. In 1418 Benevento became part of Naples, but was given back to the Pope by Ferdinand I. In 1798 it was conquered by the French, and handed over to Naples; and then in 1806 Napoleon made a present of it to his minister Talleyrand, who received thence the title of Prince of Benevento. In 1815 it was restored to the Pope, and finally with Naples was annexed to the kingdom of Italy. The city of Benevento is situated on a hill between the rivers Sabato and Calore, is surrounded with a wall, has narrow dirty streets and some interesting buildings. Since 969 it has been the see of an archbishop. Few cities in Italy deserve so much attention on account of the antiquities which they contain as Benevento. Almost every wall consists of fragments of altars, sepulchres, columns, and entablatures. Among other things the well-preserved, magnificent triumphal arch of Trajan, built in 114, deserves particular mention. It is now called *Porta Aurea* (the golden gate), and is a gate of the city. The cathedral is a beautiful building in the Lombard-Saracenic style. Pop. about 25,000.

Benevolence, a forced loan or contribution, by which the kings of England were wont, without any sanction from Parliament, to levy money from their subjects. Such benevolences had been denounced by Magna Charta; and even Richard III. had allowed the only Parliament of his reign to enact a statute declaring them illegal; but they still continued under some shape or other till finally abolished by the Bill of Rights in 1689.

Benezet, **Anthony**, American Quaker philanthropist; b. St. Quentin, France, 31 Jan. 1713; d. Philadelphia, 3 May 1784. His family came to Philadelphia from London in 1731. He earnestly opposed the slave trade, advocated the emancipation and education of the colored population of the colonies, and himself opened an evening school for negroes. Of his numerous tracts, distributed gratuitously, the most important are: 'A Caution to Great Britain and Her Colonies, in a Short Representation of the Calamitous State of the Enslaved Negroes in the British Dominion' (1767); 'Historical Account of Guinea' (1772); 'A Short Account of the Society of Friends' (1780); 'Dissertation on the

Christian Religion' (1782); 'Observations on the Indian Natives of this Continent' (1784).

Benfey, **bēn'fē**, **Theodor**, German Orientalist and comparative philologist; b. of Jewish parents, Nörten, Hanover, 28 Jan. 1809; d. 26 June 1881. He studied in Göttingen, Munich, Frankfurt, and Heidelberg, devoting himself especially to classical and comparative philology. In 1862 he was appointed to the chair of Sanskrit and comparative philology in the University of Göttingen, which he held till his death. One of his earliest literary efforts was a translation of 'Terence' (Stuttgart 1837); after this, however, he turned his attention almost exclusively to comparative philology, Oriental languages, especially Sanskrit, and mythology. In his 50 years devoted, with rare enthusiasm and persistency, to linguistic studies, he did more than any other scholar to enlarge the boundaries of Sanskrit philology. In comparative philology, though an adherent of Bopp, he deviated from his master in deriving all Indo-European words from mono-syllabic primitive verbs. This conception depends on his theory of the origin of stem suffixes. These, he holds, are almost all derived from a fundamental form, *ant*, which appears in the present participle of verbs. To support this view he assumes the most violent permutations of sounds, which set all phonetic laws at defiance. For his theory, see his 'Lexicon of Greek Roots' (1839); 'Short Sanskrit Grammar' (1868), and numerous essays. In Sanskrit he laid a foundation for the true study of the Veda by editing the 'Sāma Veda' (1848), with glossary and translation; and this work he continued by a scholarly translation of the first *mandala* of the Rig Veda in his magazine, 'Orient und Occident' (1863-4). His Vedic grammar, for which he had been collecting materials for many years, was left unfinished. He also published a 'Complete Sanskrit Grammar, Crestomathy and Glossary' (1854), and a 'Sanskrit-English Dictionary' (1866). In comparative folklore his principal work is a translation of the 'Panchatantra' (1859). It is accompanied with elaborate notes, and the first volume consists entirely of an introduction in which he traces the course of these Indian stories in their wanderings and transformations both in eastern and western literatures.

Benga, an African tribe, living on the Spanish island, Corisco, off the western coast, having moved from the interior within a few generations. The American Presbyterian Board of Missions have Christianized many of the Bengas and translated books into their language, which closely resembles the Kamerun and Dualla.

Bengal (Hind. *Bangālā*, Skt. *Vaṅgalam*, from *Vaṅga*). In the widest application the name presidency of Bengal is extended to the whole of British India, except what is under the governors of Madras and Bombay; so that it includes the provinces of Ajmir and Meirwar, Coorg, and Berar, which are under the direct administration of the governor-general; the lieutenant-governorships of Bengal, the Northwest Provinces and the Panjab; the chief commissionerships of Assam, Central Provinces, and Oudh, besides various native states, etc. But the name is now usually restricted to that portion which is under the lieutenant-governor of Ben-

BENGAL

gal, and which occupies the northeast of India, comprising the following divisions:

Divisions	No. of dists.	Area in sq. m.	Population in 1891
Burdwan	6	13,855	.....
Presidency	5	12,029	16,145,310
Rajshahi	7	17,428	8,003,740
Dacca	4	15,000	.....
Chittagong	4	12,118	13,965,230
Patna	7	23,647	.....
Bhagalpur	5	20,492	24,284,370
Orissa	5	9,053	3,865,020
Chota Nagpur	4	26,966	4,645,590
Total	47	150,588	79,909,260

By recent division of area, population (1910) is 50,723,318.

The district composed of the first five of the above divisions forms the province of Bengal proper; Patna and Bhagalpur form the province of Behar. Besides these the lieutenant-generalship includes four native states under British protection, namely, Cooch Behar, Hill Tipperah, Chota Nagpur (part of), and Orissa (part of), having a total area of 37,515 square miles, and a population of about 3,500,000.

The general physical character of Bengal is that of a practically level country, though it is surrounded with lofty chains of mountains; the northern part rests on the terraces of the Himalaya Mountains, the east is bounded by the Garos or Garrows chain, and the west is ribbed with offsets of the Vindhya Mountains. It is intersected in all directions by rivers, the principal of which are the Ganges and Brahmaputra, whose annual inundations render the soil which they reach extremely fertile. In those tracts where this advantage is not enjoyed the soil is thin, seldom exceeding a few inches in depth. The most inhospitable part of Bengal is what is called the Sunderbunds (from being covered with the soondru or sunder tree), that portion of the country through which the numerous branches of the Ganges seek the sea, or the space lying between the Hoogly River and Chittagong, about 150 miles from east to west, and about 160 from north to south. This district is infested with tigers, is traversed in all directions by water-courses or nullahs, and interspersed with numerous sheets of stagnant water called jheels, which abound with fish and waterfowl, and are much resorted to by crocodiles.

Geology and Minerals.—In the northern part of Bengal, at the foot of the Himalayas, is a band of Tertiary formation; south from which, and along the course of the Ganges, more especially east from that river, and including the greater part of its delta and that of the Brahmaputra, the country is wholly composed of alluvium or modern detritus. Calcutta stands upon strata of the transition series, which stretch west into Bahar, and are flanked north and south by tracts of crystalline formation. In the Garo Hills coal, iron, and limestone are found; and nitre effloresces on the surface around Calcutta and elsewhere. Mineral springs are not numerous.

Rivers.—The principal rivers, besides the Ganges and Brahmaputra, the latter of which enters the province at its northeast extremity, and falls into the Bay of Bengal near the principal embouchure of the Ganges, are the Soobunreka, which falls into the Bay of Bengal, in lat. 21° 35' north, south-southwest of the Hoogly; the Cusi or Coosee, which rises near

Khatamandoo in Nepal, and falls into the Ganges near Bhagalpur, in lat. 25° 20' N.; and the Dumooda, which, rising in Bahar, falls into the Hoogly about 22 miles below Calcutta. There are numerous other streams of less note, mostly tributaries of the Ganges and Brahmaputra, or their larger affluents.

Climate.—There is more regularity in the changes of the seasons in Bengal than perhaps in any other part of India; but it is subject to great extremes of heat, which, added to the humidity of its surface and the heavy dews that fall, render it generally unhealthy to Europeans. The prevalence of hot winds, which are sometimes loaded with sandy particles, is another source of disease. The seasons are distinguished by the terms hot, cold, and rainy. The hot season continues from the beginning of March to the end of May, within which period the thermometer frequently rises to 100°, sometimes to 110°. The month of September is also often intensely hot, and when so is the most unhealthy period of the year to natives as well as Europeans, owing to the profuse exhalations from stagnant waters left by the inundations, and from a rank decaying vegetation. The rainy season commences in June, and lasts till October. During the first two months of this period the rain is frequently so heavy that five inches of water have fallen in one day, the annual average being from 70 to 80 inches. It is in this season that the inundations take place, and that the Ganges overflows its delta, covering the land with its waters for more than 100 miles. The cold season, the most grateful and healthy of any to Europeans, continues from November to February, during which period north winds prevail, with a clear sky.

Forests.—In Bengal, as in India generally, great attention has been paid of late to the management of forests. Great destruction is caused among forests by fires, which are sometimes the result of accident, but more frequently made purposely by the natives in pursuance of a system of jungle cultivation that appears to prevail throughout India. This consists in cutting down and burning a patch of forest, and raising a crop in the open space, no plowing or digging being necessary. The next year this patch is abandoned, and another treated in the same way. Another cause of destruction is the wastefulness of those who use the timber. The sunder-trees, for example, which furnish the best wood for the boats which are built in great numbers throughout Eastern Bengal, have been cut down in so reckless a manner that the western parts of the Sunderbunds have already been to a large extent exhausted. In order to limit the destruction that goes on by such proceedings certain portions of the Indian forests are reserved and placed under the entire control of the government, and additions are made to these reserves every year. Of the total 11,669 square miles of forest in Bengal, in 1896 5,877 were reserved and 3,437 protected.

Animals.—Among the wild animals are tigers, elephants, boars, bears, wolves, foxes, jackals, hyenas, leopards, panthers, lynxes, hares, deer, buffaloes, antelopes, and monkeys. The most formidable of all these animals (and more so even than the lion) is the tiger, which here attains its utmost size, and perhaps also its greatest ferocity. The domestic animals include native horses, thin, ill-shaped animals, and not

BENGAL

well adapted for any kind of labor; cattle, of a very inferior breed, being extremely small and miserable looking; sheep likewise of diminutive size, with very coarse hairy wool, but when well fed their flesh is excellent. Hogs and goats are also plentiful, and buffaloes are domesticated for the sake of their milk. Reptiles are numerous and formidable, including gavials, a kind of crocodile, with which the larger rivers are infested; and among the serpent tribe, many of which are highly poisonous, the deadly cobra-de-capello. Turtles, frogs, and lizards also abound, with swarms of mosquitoes. The turtles are chiefly procured from the island of Cheduba, in the Bay of Bengal. Fish are so exceedingly plentiful as to be within the reach of almost every class of inhabitants. Game, poultry, and water-fowl of all descriptions abound in Bengal, particularly ducks, of which there is a great variety, and most of them of a superior kind. The gigantic crane, commonly called the adjutant, from the stately air with which he struts about, frequents the towns in considerable numbers, performing the office of scavenger by clearing the streets of garbage, in consideration of which duty he enjoys an entire immunity from all disturbance; his principal food is offal, toads, lizards, serpents, and insects. Crows, kites, sparrows, and other small birds are numerous.

Agriculture.—The staple crop of Bengal is rice, which is cultivated so as to produce three harvests in the year—spring rice, autumn rice, and winter rice. The last of these harvests is by far the most important. Besides sufficing for the wants of the population the rice crop leaves a large surplus for exportation. Oil seeds are also largely cultivated, chiefly mustard, sesamum, and linseed. The jute plant (*pât*) has long been cultivated, and in recent times the cultivation of it has greatly extended. It will grow on almost any description of land. Part of this crop is cultivated by those who use or manufacture it, almost all the Hindu farmers weaving cloth from it. It is now manufactured also in large mills under European management, and jute goods are now an export of some importance, though not nearly so much so as jute in the raw state for manufacture in Europe. The sunn plant, somewhat resembling the Spanish broom, is now quite extensively cultivated and exported to Great Britain, affording excellent material for both sails and cordage, and being made into fishing nets by the natives. Cotton is grown over all India, but the best of the herbaceous kind is raised in Bengal and on the Coromandel coast; the finest grows on light rocky soil. The cotton of India is generally inferior to that of the United States; but this is believed to be wholly owing to careless cultivation, and to the slovenly manner in which it is prepared for the market. The cultivation of the date palm and the manufacture of date sugar are carried on to a considerable extent, forming a profitable business for the cultivator. This kind of sugar forms an article of export. The sugar cane is cultivated, but not nearly to such an extent as might be expected. There are two kinds of sugar cane, a yellow hard cane, about the thickness of a finger; the other much thicker and deeply stained with purple. The latter is the most productive, but the most troublesome to cultivate, and therefore avoided by the more indolent farmers. Tobacco, which requires a light soil, is grown in three different

situations,—in rich spots of land contiguous to the farmer's house,—in high land suitable for the growth of sugar cane,—and on the banks of rivers. The betel leaf, famous for its intoxicating quality and largely used over all India on that account, is cultivated in what is called a *voroj* or fort, and is carefully protected from the sun and wind. Indigo being one of the principal articles of foreign commerce with Bengal, is extensively cultivated in that province. The opium production of Bengal was a government monopoly under Mohammedan rule, and has been retained as such by the British. All the juice of the opium poppy must be sold to the government at a fixed price. This cultivation is carried on in the west of Bengal in the divisions of Chota Nagpur and Patna. Orchards of mango trees are to be found in every part of Bengal, the fruit being in general demand during the hot months. The cinchona tree and the tea plant have both in recent times been added to the agricultural products of Bengal; the former in the native state of Sikkim, the latter especially in Cooch Behar (Darjiling), Chittagong, and Chota Nagpur.

The luxuriance of vegetation in Bengal is perhaps unequaled in any other part of the world. The cultivation of the land requires little effort, and large crops are obtained without the application of any other manure than the sediment or mud deposited by the inundations. It is doubtful, however, how far this facility is good, since it seems to have had the effect of preventing all attempts at improvement either in the science of agriculture itself or in the implements used in its practice. The Indian plow is of wretched construction, having neither colter nor mold-board, and in some districts it wants even the share, while the animals by which it is dragged, two oxen or cows, are miserable half-starved creatures. The reaping hook (*kastyā*) is a most inefficient implement,—the curved or cutting part of the blade is six inches long by one and a half broad, with teeth like a saw—the handle is about four and a half inches long. The *dengki*, by which the husks are separated from the grain, is another wretched implement, and so ill adapted to its purposes that one fifth part of the whole grain is sacrificed in the operation. Nearly all the other implements in use are of an equally rude and imperfect description. Rotation of crops and the use of fallows are unknown to the farmers of India; the land is generally in an exhausted condition, and the enclosures everywhere bad. Grain is trodden out by oxen, and stacking corn is unusual, the corn being often left exposed to the weather. Irrigation, however, is well understood,—necessity giving rise to invention,—and is accomplished by the most ingenious and efficient means.

Manufactures.—The principal manufacture of Bengal is that of cotton goods, including cotton piece goods of various descriptions, calicoes, thread, and sail-cloth. Muslins of the most beautiful and delicate texture were formerly made at Dacca, a city in this province, but the manufacture is almost extinct. "Some of these fabrics," says Tavernier, "were so fine that they could hardly be felt in the hand, and the thread when spun was scarce discernible." In Ward's 'History' of the Hindus this character in the muslin of Dacca is confirmed; though perhaps in both cases it is a little exaggerated. "When

this muslin is laid on the grass," says the latter, "and the dew has fallen on it, it is no longer discernible." The extraordinary fineness and beauty of India muslins, manufactured under the disadvantages of rude machinery and ill prepared material, is attributed to the exquisitely fine sense of touch possessed by the Hindus, and to the hereditary continuance of a particular species of manufacture in families through many generations.

The modern decay of the muslin manufacture of India has been owing in a great measure to the successful competition of Great Britain, and to the circumstance of British fabrics being subject to no duty in Bengal, while high duties were levied on the fabrics of Bengal in Great Britain. These duties are now abolished. Large quantities of a coarse cloth, manufactured from jute, are made in various districts of Bengal. Sericulture is carried on more largely in Bengal than in any other part of India, and silk-weaving is still a leading industry in many of the districts; but of late years there has been a serious decline. One branch of this industry, however, seems more flourishing than some others, namely, the cultivation of *tasar* or wild silk, the worm that produces it feeding upon the leaves of the *sal* and other forest trees. On the other hand, various new manufactures, carried on by machinery, are rising up. The most important of these are the industries connected with jute, cotton, and sugar. These are already affording employment to many thousands, and the natives are said to show great aptitude for factory work. The jute mills alone employ nearly 40,000 hands.

Commerce.—The commerce of Bengal, both internal and external, is very large. Multitudes of native boats and other craft navigate the rivers. The imports to Calcutta from the interior have been valued at over \$13,000,000, consisting of rice, tea, jute, indigo, linseed, mustard seed, wheat, etc. The foreign trade is large and increasing. Almost the whole of it passes through Calcutta, and the value of it annually is over \$275,000,000, over \$170,000,000 being exports. The most important exports are opium, jute, indigo, oil seeds, tea, hides and skins, and rice; the chief import is cotton piece goods. The foreign trade is chiefly with Great Britain, China, the Straits Settlements, France, the United States, and Ceylon.

Finance.—The total revenue of the lieutenant-governorship of Bengal in the year ending 31 March 1908, was (calling the rupee 25 cents), \$46,293,259, and the total expenditure \$21,611,943. The surplus goes to meet the expenses of the general government of India. The principal sources of revenue are land, salt, opium, excise, stamps, and customs, assessed taxes, etc.

Education, Social, and Domestic Conditions, etc.—It is one of the consequences of the extreme poverty of the bulk of the population of Bengal, that education should be there at a very low ebb. The proportion of boys of school-going age attending school is only about 28.6 per cent; of girls 2 per cent. The first rudiments of education are often given in small schools called *pāthshālās* , in which the fees are extremely low, and in which only reading, writing, and arithmetic are taught. The greater number of these, although private establishments, receive aid from government. In the

primary schools the principle of keeping the standard of instruction as low as possible is adhered to; and this is intended to be done till the whole of the poorer classes shall have been brought under some kind of instruction. In the meanwhile, all who have time or means for learning more are encouraged to resort to schools of a better class. With this view a system of intermediate schools was established in 1875 between the primary and what are called the middle schools, and this step has been rewarded with a satisfactory measure of success.

In addition to the schools already mentioned there are various educational institutions of a higher kind connected with government. The highest of these institutions is the Calcutta University, with the four faculties of arts, law, medicine, and engineering. Affiliated to the university are a number of general and professional colleges, in one of which all who have passed the university entrance examination and wish to proceed to a degree must enroll themselves. The majority of educated Bengal youths, according to official information, resort to two professions, the public service and the law, in consequence of which many cannot obtain employment. With a view to open out other lines of employment the government is endeavoring to establish technical and industrial schools of a superior kind in many places. A healthy ambition is said to exist among the natives of Bengal to raise themselves by education. Almost every Bengalee youth who can afford the means aspires to an English education as one of the main objects of his life. One result of the Prince of Wales' visit to Bengal at the end of 1875 was that the wealthier natives raised subscriptions to commemorate the event by founding educational institutions. The secondary schools are generally divided into "English" and vernacular. Those in which English forms part of the regular course of study of all the scholars, or at least of all in the higher classes, are reckoned as English; if English is optional only, they are reckoned as vernacular. In the common languages of the country there were till lately almost no books to be had; but the Bible, or parts of it, has now been printed in the various languages and widely circulated, as well as a number of other works.

The private houses of Bengal are huts, with pentroofs constructed of two sloping sides which meet in a ridge. One hut of this kind serves the poor man for himself, family, and cattle; wealthy men increase the number of houses without altering the plan, and without having any communication between the different apartments. The walls are generally made of mud, and the floor is raised a foot or two above the level of the plain, to prevent it being flooded in the rainy season, which, however, is not always accomplished. The frames of the houses consist of bamboos tied together—wooden posts and beams being used in the construction of the houses of the wealthy only. The huts collectively sufficient for the accommodation of a family are usually surrounded by a common fence. Farmers have in general larger and better houses than people living in towns. A rich farmer will sometimes have as many as 12 or 14 huts within his enclosure. The food of the class just above the rank of common laborers consists chiefly of rice, wheaten flour, fish, vegetables, and butter, with various condiments and seasonings.

BENGAL — BENGALI

In the case of the laborer there is neither flour, fish, vegetables, nor butter, the chief food of that class being a coarse description of rice.

History.—The English first got a firm footing in Bengal about 1644, when, through the influence of an English medical man named Boughton, a favorite of the emperor of Delhi, the East India Company obtained permission to locate themselves at Hugli or Hoogly, some 28 miles above Calcutta. In 1686 the company's factors, having had a rupture with the Moslem commander at the place where they were located, removed to Calcutta, then the village of Chuttanutt, where they continued to carry on their trade. In 1700 the viceroy of Bengal, being in want of money to dispute the succession to the Mogul throne, obtained a large sum from the company for the township on which their factory stood at Calcutta, and some adjacent lands. Seven years afterward, namely in 1707, Calcutta was erected into a presidency, and the foundation of British power in India laid—presenting a striking proof of the energy of the British character, there having been settlements in India by the Portuguese, Dutch, French, and Danes, previous to, and contemporary with, the location of the English in that quarter of the world; but the mighty achievement of obtaining the supremacy in that vast empire could, it appears, be accomplished only by the British. For nearly half a century the company pursued a peaceful and profitable commerce; but at the expiration of that period, 1756, Calcutta was attacked and taken by the Soubahdar of Bengal, who threw the Englishmen he found there, 147 in number, into a dungeon, the well-known "black-hole" of Calcutta, where 123 of them perished in 11 hours. In the ensuing year Calcutta was retaken by Lord Clive—an event which was followed by a series of victories on the part of the British, that terminated in the entire conquest of India. In consequence of unprecedented drought great scarcity of food prevailed in 1873 and 1874, but the prompt measures of the government were sufficient to prevent any widespread mortality. A bill conferring upon agricultural tenants a transferable interest in their holdings and protecting them against eviction was passed in 1885.

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Bengal, Bay of, that portion of the Indian Ocean between Hindustan and Farther India, or Burma, Siam, and Malacca, and extending south to Ceylon and Sumatra. It receives the Ganges, Brahmaputra, and Irrawadi. Calcutta, Rangoon, and Madras are the most important towns on or near its coasts. On the west coast there are no good harbors, but the east coast has a considerable number, among them being Aracan, Cheduba, Negrals, Mataban, and Syriam. On account of the extreme heat the rate of evaporation is very high, sometimes amounting to an inch per day. The tide sometimes rises to the height of 70 feet. In summer the northeast monsoon prevails, and in winter the southwest monsoon.

Bengal, or Bengola, Light, a firework, giving a vivid and sustained blue light. It is used for signals at sea. It is composed of six

parts of nitre, two of sulphur, and one of antimony tersulphide. These are finely pulverized and incorporated together, and the composition pressed into earthen bowls or similar shallow vessels.

Bengali, bēn-gā'le, the dealer's name, originating in a mistake as to their origin, for any of several of the beautiful little African wax-bills (q.v.), bred and sold as cage-birds; especially the "blue-bellied finch" (*Estrilda bengala*), which is ashy-brown above, with the wing quills brown, and the sides of the head, the throat and whole lower surface azure blue, spotted under and near the wings. They add to this charming dress lively manners and an agreeable song. Their requirements in the cage are like those of a canary.

Bengali Era, The, one of the chronological eras of the Hindus, supposed to have been derived from the Hegira. The Hindus, however, use the sidereal year, and the Mohammedans the lunar, hence the Mohammedan epoch is at present some nine years in advance of the Bengali.

Bengali, or Gaura, Language, one of the five modern languages of Hindustan, which are derived from the ancient Sanskrit. Its name is derived from Banga, the Sanskrit name of the country, with the Arabic article *al* suffixed; the whole being corrupted into the present form. Gaura is derived from Gaur, the name of the ancient metropolis. It is spoken by 42,000,000 of British subjects, of whom about one fourth speak also some other dialect. It extends over the regions on the lower Ganges, from Patna down to its delta, being purest in the province of Bengal and in the eastern regions. This language consists of an aboriginal basis, with which a much greater portion of Sanskrit and Pracrit has been admixed than with any one of its cognates; with a considerable addition of Afghan, Persian, Arabic, Portuguese, Malay, and English words. Although the Sanskrit element predominates as regards the words, the grammatical forms of the language differ more from the Sanskrit than the forms of the Greek, Latin, Gothic, and Persian; most of the flexions of nouns and verbs having been lost, and their places being supplied by auxiliary words and by circumlocution. Notwithstanding this, it admits in the higher style, many of those forms which are intelligible only to more cultivated persons. There are no forms of gender, and only few feminine words are formed by the suffixes *i* and *ini*. There are seven cases made by suffixes—nominative, accusative, instrumental, dative, ablative, genitive, and vocative. The plural of nouns is made by suffixing *dig* to the genitive singular. It delights in compound words, formed especially by means of a sort of past participle; elegant Sanskrit compounds being unidiomatic. There is but one conjugation, whose radical is the imperative. Compound tenses are made by the auxiliaries, meaning to do, to be, to become. The singular and plural of verbs are often confounded; the plural with a singular noun denoting respect, the singular with the plural noun being used in speaking to inferiors. There are three simple moods, infinitive, indicative, imperative; four others being periphrastic, the potential, optative, inchoative, and frequentative. Any verb is conjugable negatively by the suffix *na*. The system

of writing is that of the *devanāgarī* of the Sanskrit language, but the forms of letters are more broken and twisted. B and v, however, are written by one character, and the characters of the sounds, s, z, sh, are interchangeable.

No book written in Bengali appeared before 1500 A.D. After the settlement of Moslems in Gaur, the Voisyas and Soodras (agricultural and servile castes) began to study Persian, to gain a livelihood, and were well rewarded by the conquerors. Except the stories of Krishna's study, the rules of arithmetic in verse, and a few other elementary books, the vernacular literature was very poor, until Rajah Krishnachandra Roy Bahadoor restored Hindoo literature in India, by bringing in pundits and endowing schools. Owing to the abundance of Sanskrit books, and the prejudice of most Brahmins against the Bengali, this was neglected until 1800, when the college of Fort William was founded, and the study of Bengali was made imperative and collateral to the Sanskrit. Many Bengali works have since been printed at Calcutta and Serampore. The first native newspaper was published at Serampore in 1818. Considerable change has been made since in the diction and composition of this language, which continues to be enlarged and ennobled, by being capable of borrowing indefinitely from the venerable Sanskrit mother. Gilchrist, H. P. Forster, Carey, W. Morton, Hunter, Mohun Persaud, Tahir, Tarachand Chukruburti, Sir G. C. Haughton, have published Bengali English dictionaries and vocabularies, and Ram Comul Sen has translated Todd's edition of Johnson's English dictionary into Bengali.

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Bengazi, bēn-gā'ze, or Benghazi, a town in North Africa, capital of the vilayet Barca, on the east coast of the Gulf of Sidrah. Next to Tripoli it is the most important seaport on this coast. The harbor is fast silting up, and admits only small vessels; but there is still a considerable trade, cattle, corn, etc., being exported, especially to Malta. It is sometimes identified as the ancient Hesperides and in the time of Ptolemy III. was called Berenice. Pop. about 15,000.

Bengel, bēng'el, Johann Albrecht, German theologian and philologist: b. Winnenden, Württemberg, 24 June 1687; d. Alpirsbach, 2 Nov. 1752. He studied at Stuttgart and Tübingen, and became pastor and head of a school at Denkendorf. He especially applied himself to the critical study of the Greek Testament, of which he published an edition in 1723. Among his other works are 'Apparatus Criticus Novi Testamenti,' a work of great value for its suggestive condensed comments, which first appeared in 1742, and has been several times reprinted, etc. An attempt has been made to adapt his 'Gnomē' to English readers in the 'Critical English Testament,' by Blackley and Hawes (1866).

Benger, bēng'gēr, Elizabeth Ogilvy, English historical writer: b. Wells, Somersetshire,

1778; d. London, 9 Jan. 1827. She early displayed a turn for literature, but her straitened means preventing her from gratifying this taste by the purchase of books, she was in the habit of perusing the opened books in a bookseller's window, and would return day after day to see if the page had been turned over. In 1802 she removed with her mother to London. Her first literary attempts, including a poem on the abolition of the slave trade, and two novels, attracted little attention; but she was more successful with her 'Memoirs of Mary Queen of Scots,' and of 'Elizabeth Queen of Bohemia.' She also wrote the Lives of Anne Boleyn, Mrs. Elizabeth Hamilton, and John Tobin, the dramatist. Her chief merits are a clear style and industry in the collection and arrangements of facts.

Bengough, John Wilson, Canadian poet: b. Toronto, 5 April 1851. In 1873 he established the *Grip*, a humorous weekly in Toronto. His political cartoons in this paper were highly artistic. He is also widely known as a lecturer and a poet. His publications include: 'Ontario, Ontario' (a famous election song); 'Grip's Cartoons' (1875); 'Popular Readings, Original and Selected' (1882); 'Caricature History of Canadian Politics' (1886); 'Motley: Verses Grave and Gay' (1895); 'The Up to Date Primer: A First Book of Lessons for Little Political Economists' (1896); etc.

Benguella, bēn-gā'la, or Benguella, a district belonging to the Portuguese on the western coast of South Africa, forming one of the three provinces of Angola; bounded north by the province of Loanda, south by that of Mossamedes, and west by the Atlantic Ocean. The interior of the country is mountainous, the direction of the elevated lands being from northeast to southwest. It is well watered, being intersected by numerous rivers and streams. Its vegetation is luxuriant, and it possesses extensive forests. Its products are those of tropical Africa generally. Coffee grows wild. The soil in parts is well adapted for the production of grain; but little is grown. The larger animals of Africa are numerous, such as lions, elephants, and hippopotami. The minerals include copper, sulphur, lead, gold, and silver. The only town worth mention is the seaport, Benguella, founded in 1617 as San Felipe de Benguella, which is pleasantly situated and fairly healthy. It exports rubber, coffee, skins, ivory, etc. A short railway starts from the town, the population of which is about 3,000. The population of the province may amount to several millions.

Benhadad, the name of three kings of Syria, all mentioned in Scripture. The most conspicuous is the second, who was equally remarkable for his arrogance in prosperity and his craven spirit in adversity. He first sent an insolent message to Ahab, claiming himself and all his subjects as his slaves; and after Ahab encountered and defeated him, Benhadad sent a message abjectly begging his life. Ahab was impolitic enough to grant it, and Benhadad, disregarding all his promises, proved a bitter enemy to his successor. He was murdered about 890 B.C.

Benham, Andrew Ellicott Kennedy, American naval officer: b. New York, 10 April 1832, d. at Lake Mahopac, N. Y., 11 Aug. 1905. He entered the navy in 1847; served in the East India and the Home squadrons in 1847-52;

attended the United States Naval Academy, 1852-3; was commissioned lieutenant in 1855; lieutenant-commander in 1862; commander, 1866; captain, 1875; commodore, 1885; and rear-admiral in 1890, and retired in 1894. During the Civil War he served in the South Atlantic and West Gulf Blockading squadrons. In April 1893 he commanded one of the divisions in the great naval display at New York; in 1894, as commander of a squadron at Rio de Janeiro, Brazil, he forced the commander of the insurgents' squadron to raise the blockade of the city and to discontinue firing on American merchant vessels; and in 1898 was naval prize commissioner in Savannah, Ga.

Benham, Henry W., American military engineer: b. Cheshire, Conn., 1816; d. 1 June 1884. He was graduated at the United States Military Academy in 1837; and became brevet major-general, United States army. He commanded the engineer brigade and laid several pontoon bridges under fire during the Chancellorsville battles; constructed and commanded the defenses at City Point; devised the picket shovel; and made many improvements in the construction of pontoon bridges, in which he was a recognized expert. After the war he was in charge of the Boston harbor sea wall and later of the New York harbor defenses; retired from active service, 1882.

Benham, William, English clergyman and author: b. West Meon, Hampshire, 15 Jan. 1831. He was vicar of Addington, 1867-73; of Margate, 1873-80; of Marden, 1880-2; and rector of St. Edmund's, Lombard Street, London, from the year last named. He was appointed canon of Canterbury in 1885. He has published among other works: 'The Church of the Patriarchs' (1867); 'Catharine and Crawford Tait'; 'How to Teach the Old Testament' (1881); 'Annals of the Diocese of Winchester' (1884); 'A Short History of the Episcopal Church in America' (1884); 'The Dictionary of Religion' (1887); 'Life of Archbishop Tait,' with Davidson (1891). He has edited the 'Ancient and Modern Library of Theological Literature.'

Beni, bā'ne, one of the nine departments of Bolivia, South America. It is in the northeastern part, with an area of 100,580 square miles. It is a level, fertile region, growing cocoa, coffee, sugar-cane, and tobacco, and containing vast forests of rubber-trees, and rich deposits of gold. Pop. 26,750; chief town, Trinidad.

Beni, a river of South America, formed by the junction of several streams flowing eastward from the Andes in about 18° south. Its course is north and northeast through Bolivia; and on the border of Brazil it unites with the Mamoré to form the Madeira, by which its waters are carried to the Amazon. It receives several tributaries of importance, the chief being the Madre de Dios from Peru, and it is navigable throughout a great part of its course. Its length is about 850 miles.

Beni-Hassan, bā'ne-hās'san, a village of middle Egypt, on the east bank of the Nile, remarkable for the rock-hewn tombs in the neighborhood, supposed to have formed a necropolis for the chief families of a city. Hermopolis, on the opposite bank, and exhibiting interesting paintings, and hieroglyphics. The paintings portray incidents in the ancient life of Egypt, and the inscriptions are of great

value for the light they throw upon the history of the 12th dynasty.

Beni-Israel, bā'ne-iz-rā-ēl, a race in the west of India (the Konkan sea board, Bombay, etc.), who keep a tradition of Jewish origin, and whose religion is a modified Judaism. By some persons they are supposed to be a remnant of the 10 tribes. Their number is estimated at 5,000, and in feature they resemble the Jews of Arabia.

Beni Israel, a small antelope. See MADOQUA.

Beni-Khaibir (sons of Keber), an Arabic tribe supposed to be a remnant of the ascetic tribe of Rechabites.

Beni-Mzāb, a race or tribe of Berbers that dwell in the Sahara, near its northern border, and recognize the supremacy of the French. They number some 60,000, of whom about 15,000 are in the town of Ghardaya. They are peacefully disposed, and numbers of them are employed in Algiers in various occupations.

Beni-Suef, bā'ne-swāf, the capital of a province of the same name in Egypt; is pleasantly situated on the left bank of the Nile, 70 miles south from Cairo, with which it is connected by railway. It is the entrepôt for the produce of the Fayoum, and contains cotton mills, controlled by the state, and alabaster quarries. Pop. 10,085.

Benicarlo, bā'ne-kār-lō', a seaport of Spain, in Valencia, in the province of Castellon, surrounded with walls, having an old castle, a fine church, with an octagonal tower, and some manufactures, etc. It is chiefly noted as being the place of export of the red wines called by its name which are produced in the surrounding country. These are chiefly sent to Bordeaux to be mixed with clarets, or to England to be manufactured into port.

Benic'ia, Cal., a city in Solano County, at the mouth of the Sacramento and San Joaquin rivers, and on the Southern P. R.R.; 30 miles northeast of San Francisco. It contains a United States arsenal and barracks; St. Augustine College (Roman Catholic); St. Catherine's Convent (Roman Catholic); extensive shipyards, and large agricultural, tanning, cement, and meat-packing plants. The city was once the capital of the State. Pop. (1910) 3,100.

Benicia Boy, a popular name for a once noted pugilist, John C. Heenan, whose home was in California. His fight with Sayers attracted wide-spread attention.

Benin, bē-nin', Africa; a negro country or kingdom, on the Bight of Benin, Gulf of Guinea, extending along the coast on both sides of the Benin River, and to some distance inland, but the limits are not accurately known. The capital is Benin, a town which at one time had some 15,000 inhabitants, but is now said to have greatly decreased in population. It is situated about 50 miles from the coast, and consists of clay-built houses neatly thatched with reeds, straw, or leaves. The coast, which now belongs to the British, is thickly indented with estuaries, some of them of considerable breadth and studded with islands. The country is flat for some distance inland, when it begins gradually to rise till it attains a height of over 2,000 feet. It is very well wooded, and being likewise well watered, it is rich in all the vegetable produc-

BENIN — BENJAMIN

tions of the tropics. Cotton is indigenous, and is woven into cloth by the women. Sugar-cane of good quality is grown; and yams, plantains, maize, rice, etc., are cultivated. The religion is Fetishism. The climate, especially at the mouths of the rivers, is very unhealthy. There is a considerable trade in palm oil and other products.

Benin, Bight of, Africa, a large bay on the west coast, forming a portion of the Gulf of Guinea, and extending from the Niger delta westward to about the river Volta.

Beniowsky, Moritz August von, há-ně-öff-ski, mō'rítz ow'goost fōn, Hungarian adventurer: b. Verbova, Hungary, 1741; d. 23 May 1786. The son of an Austrian general, he served as lieutenant in the Seven Years' war and in the Polish war against Russia. In 1769 he fell into the hands of the Russians, who exiled him to Kamchatka. Availing himself of a knowledge of navigation, he succeeded in saving from wreck the vessel which was to convey him to Siberia. This feat won for him the sympathy of the governor of Kamchatka, which was still more strengthened by his proficiency in chess, and he appointed him tutor of his children. One of his pupils fell in love with him, and with her father's consent they were married. In 1771 he effected his escape from Kamchatka with the assistance of his wife, who, although she had since learned that he had another wife in Hungary, followed him to Formosa and Moscow, at which latter place she died. On his return to Paris he undertook to found a French colony at Madagascar, where he arrived in June 1774, founded his colony, and in 1775 was proclaimed king by some of the native tribes, while his wife was proclaimed queen. The governor of the Isle of France refusing to supply him with men to support his state, Beniowsky applied directly to the French government, but without success. Disgusted with the French and their colonies, he now entered the Austrian service, and was commander in the battle of Habelschwerdt, in 1778, against the Prussians. His subsequent efforts to interest the English government for Madagascar were fruitless, but with the support of a wealthy firm of Baltimore, U. S. A., he effected a landing in Madagascar, but was killed soon after in a conflict with troops from the Isle of France. He wrote his autobiography in French; it was translated into German by George Forster, into English by William Nicolson, and into various other languages. Kotzebue dramatized his character and career in his play entitled 'The Conspiracy in Kamchatka.'

Benish' Days, days (Mondays, Wednesdays, and Saturdays) on which the modern Egyptians don the *benish* (whence the name), or ordinary garment, relax their religious duties, and engage in pleasures.

Benjamin, the youngest son of Jacob and Rachel (Gen. xxxv. 16-18). Rachel died immediately after he was born, and with her last breath named him Ben-oni, "son of my sorrow"; but Jacob called him Benjamin, "son of my right hand." He was a great comfort to his father, who saw in him the image of the wife he had buried, and of Joseph, whose loss he also mourned. He could hardly be persuaded to let him go with his brethren to Egypt. The tribe of Benjamin, small at first, was almost exterminated in the days of the Judges, but

afterward it greatly increased. On the revolt of the 10 tribes Benjamin adhered to the camp of Judah; and the two tribes ever afterward closely united. King Saul and Saul of Tarsus were both Benjamites.

Benjamin, Charles Henry, American engineer: b. Patten, Me., 29 Aug. 1856. He graduated at the University of Maine, and was professor of mechanical engineering there, 1880-6. Since 1889 he has been professor of the same subject in the Case School of Applied Science, Cleveland, Ohio. Publications: 'Notes on Heat and Steam' (1894); 'Notes on Machine Design' (1895); 'Mechanical Laboratory Practice' (1898); 'Evolution of the Machine Tool' (1898); 'Power Losses in Machine-Shops' (1900); 'Development of Fly Wheels' (1900); and monographs in the 'Transactions' of the American Society of Mechanical Engineers, Vols. XVIII.-XXI.

Benjamin, Judah Philip, American lawyer: b. St. Croix, West Indies, 11 Aug. 1811; d. Paris, 7 May 1884; of English parentage and of Jewish faith. He was educated at Yale College; admitted to the bar in New Orleans in 1832; and elected to the United States Senate in 1852 and 1858. At the beginning of the Civil War he resigned from the Senate and declared his adherence to the State of Louisiana. In 1861 he accepted the office of attorney-general in the Cabinet of Jefferson Davis, and afterward became successively Confederate secretary of war and secretary of state. After the war he went to London, England, where he was admitted to the bar in 1866. He gained a successful practice, and in 1872 was formally presented with a silk gown. He wrote a 'Treatise on the Law of Sale of Personal Property' (1868).

Benjamin, Marcus, American editor and compiler: b. San Francisco, 17 Jan. 1857. He graduated at Columbia School of Mines, 1878, and was chemist at the United States Appraiser's Store, New York, 1883-5. Since 1883 he has been a regular contributor to 'Appleton's Annual Cyclopædia' and the 'Cyclopædia of American Biography,' and edited a number of the Appleton guides and handbooks. He was on the editorial staff of the 'Standard Dictionary'; 'Encyclopædic Dictionary'; 'Johnson's Universal Cyclopædia'; and the 'International Year Book'; and has translated Bertholet's 'Explosive Materials' (1883). Since 1896 he has been connected with the United States National Museum.

Benjamin, Park, American journalist, poet, and lecturer: b. Demerara, British Guiana, 14 Aug. 1809; d. New York, 12 Sept. 1864. He studied law, but later took up literary work, helping to found 'The New World' in New York. His poems, of a high order of merit, have never been collected. 'The Contemplation of Nature,' read on taking his degree at Washington College, Hartford, 1829; the satires, 'Poetry' (1843); 'Infatuation' (1849); 'The Nautilus'; 'To One Beloved'; and 'The Old Sexton' are among his works. He was associated editorially with Epes Sargent and Rufus W. Griswold.

Benjamin, Park, American lawyer, editor, and miscellaneous writer, son of the preceding: b. New York, 11 May 1849. A graduate of the United States Naval Academy (1867), he served on Admiral Farragut's flagship, but resigned in

BENJAMIN — BENNETT

1869. As a lawyer he has been a patent expert. He edited the 'Scientific American' (1872-8), and Appleton's 'Cyclopædia of Applied Mechanics'. He has written 'Shakings: Etchings from the Naval Academy' (1867); 'The Age of Electricity' (1886); 'The Intellectual Rise in Electricity, a History'; 'The United States Naval Academy' (1900); etc.

Benjamin, Samuel Green Wheeler, American traveler, artist, and miscellaneous writer: b. Argos, Greece, 13 Feb. 1837. He was educated at Williams College; was assistant librarian in the New York State Library, 1861-4; and was United States minister to Persia, 1883-5. Among his numerous works, both in prose and verse, are: 'Art in America'; 'Contemporary Art in Europe' (1877); 'Constantinople' (1860).

Benjamin, William Augustus, American journalist, poet, composer: b. 26 July 1865. His most prominent poems are: 'From Then Till Now' (1889); 'The Storm' (1889); 'Musings of Shadow-Silence' (1890); 'Twilight Fancies' and 'The Tide of Life' (1891); etc. Of his musical compositions, 'The Surge of the Sea' (1890); 'The Promise' (1894); and 'Go to Sleep' (1895).

Benjamin of Tudela, Jewish traveler: b. Tudela, Navarre, in the 12th century; is chiefly known by his travels over large portions of Europe, Palestine, Mesopotamia, the East Indies, and Ethiopia. As the first European traveler who penetrated far into the East, he furnishes a great amount of interesting information, and though not free from error or fable, proves himself worthy of the high estimation in which he has always been held among his Jewish countrymen for soundness of judgment and extent of learning. His 'Itinerary,' first printed in Hebrew at Constantinople in 1543, has been translated into many languages. The edition of Asher (London and Berlin 1840-1) contains an English translation.

Benjamin-Constant, Jean Joseph, bōn-zhāmān-kōn-stōn, zhōn zhō-sēf, French painter: b. Paris, 10 June 1847; d. there, 26 May 1902. He studied under Cabanel, and exhibited in the salon of 1869, a scene from 'Hamlet.' His taste inclined him to Oriental subjects and the nude, and his vivid coloring and dramatic treatment made his work fashionable in Paris and London. His work displays much finished and minute detail, but he paid chief attention to harmony of effect and decorative value. Among his Oriental pictures are 'Mahomet II.'; 'Les Chérifas'; 'Les Funérailles de l'Emir'; 'La Justice du Chérif.'

Benkulen. See BENCOOLEN.

Benndorf, Otto, German archæologist: b. 13 Sept. 1838; d. 2 Jan. 1907. He studied at Erlangen and Bonn, went to Italy and Greece, 1864-8, and was professor of archæology at the universities of Göttingen, Zurich, Munich, Prague, and Vienna. In 1875 he made a second archæological tour to Samothrace; in 1881 and 1883 he made two expeditions, at state cost, to southwestern Asia Minor; in 1898 he was made director of the Austrian Archæological Institute. He wrote 'The Ancient Sculptures in the Lateran Museum' (in conjunction with Schöne) (Leipsic 1867); 'Ancient Historical Helmets and Sepulchral Masks' (1878); 'Travels in Southwest Asia Minor' (1884); etc.

Benne Oil, a valuable oil expressed from the seeds of *Sesamum orientale* and *S. indicum*, much cultivated in India, Egypt, etc., and used for purposes similar to those of olive oil. Also called sesamum oil and gingelly oil. See SAME.

Bennet, Elisabeth, the heroine of Jane Austen's novel, 'Pride and Prejudice.' See Howells, 'Heroines of Fiction' (1901).

Bennet, Henry (EARL OF ARLINGTON), English statesman: b. Arlington, Middlesex, 1618; d. 28 July 1685. He was devoted to the cause of Charles I., and was appointed under-secretary of state; he fought in several battles, and was wounded at Andover, but after the battle of Worcester he retired to Spain. Upon the restoration he returned to England, and was appointed keeper of the privy seal, and shortly afterward secretary of state. In 1664 he was created Baron Arlington; in 1670 became noted as one of the famous Cabal, but is not accused of entertaining their extreme sentiments; he was created Earl of Arlington in 1672. He was one of the plenipotentiaries sent to Utrecht to negotiate a peace between Austria and France, but the mission not being successful, an endeavor was made by his colleagues to cast the odium of the failure upon him. He defended himself, however, before the House of Commons, and was acquitted. The war with Holland, which is said to have been caused by the machinations of the Cabal, lost to Arlington the favor of the king and people; but in spite of this he received the office of chamberlain. In 1679 he became a member of the new council, and retained his office of chamberlain on the accession of James II.

Bennett, Alfred Allen, American chemist: b. Milford, N. H., 30 Nov. 1850. He graduated at the University of Michigan 1877; became professor of chemistry and physics in Iowa Wesleyan University; and since 1885 has been professor of chemistry in Iowa State College. Publications: 'Text Book of Inorganic Chemistry,' 2 vols., and articles in the 'American Chemical Society Journal.'

Bennett, Charles Edwin, American educator: b. Providence, R. I., 6 April 1858. He graduated at Brown University 1878; pursued graduate studies at Harvard and in Germany 1881-4; was professor of Latin at the University of Wisconsin 1889-91; of classical philology at Brown 1891-2; and in the latter year was elected professor of Latin at Cornell. He has been a frequent contributor to classical journals and editor of classical texts. Publications: 'A Latin Grammar' (1895); 'The Foundations of Latin' (1898); 'Critique of Some Recent Subjunctive Theories' (1898); 'The Quantitative Reading of Latin Poetry' (1899); 'The Teaching of Greek and Latin in Secondary Schools' (1900). He has edited: 'Xenophon's Hellenica, Books V.-VIII.' (1892); 'Tacitus, Dialogus de Oratoribus' (1894); 'Cicero, De Senectute' (1897); and 'Cicero, De Amicitia' (1897).

Bennett, Charles Wesley, American Methodist clergyman and educator: b. East Bethany, N. Y., 18 July 1828; d. 17 April 1891. He was principal of Genesee Wesleyan Seminary (1869-71); professor of history and logic at Syracuse University (1871-85); professor of historical theology, Garrett Biblical Institute, Evanston, Ill.

BENNETT

(1885-91). He wrote 'National Education in Italy, France, Germany, England, and Wales' (1878); and 'Christian Art and Archaeology of the First Six Centuries' (1888).

Bennett, Edmund Hatch, American lawyer: b. Manchester, Vt., 6 April 1824; d. 2 Jan. 1898. He was graduated at the University of Vermont in 1843, and admitted to the bar in 1847. He practised for many years in Taunton, Mass., and was mayor of that city 1865-7, and judge of probate and insolvency of Bristol County 1858-83. He was lecturer at Harvard Law School 1865-71, and afterward professor and dean at the Law School of Boston University. His works include 30 volumes of 'English Law and Equity Reports'; '9-12 Cushing's (Mass.) Reports'; 'Massachusetts Digest' (3 vols.); 'Bingham on Infancy'; 'Blackwell on Tax Titles'; 'Leading Criminal Cases' (2 vols.); 'Goddard on Easements'; 'Benjamin on Sales'; 'Pomeroy's Constitutional Law'; 'Indermaur's Principles of Common Law'; and 'Fire Insurance Cases' (5 vols.). He has made contributions to professional journals, and has been co-editor of the 'American Law Register.'

Bennett, Emerson, American novelist: b. Monson, Mass., 16 March 1822; d. Philadelphia, Pa., 12 May 1905. He began to write at an early age and published some 60 or more extremely sensational tales which have been popular with uncritical readers. Among them are 'Prairie Flower'; 'The Outlaw's Daughter'; and 'The Forged Will.'

Bennett, James Gordon, American journalist: b. Newmill, Keith, 1 Sept. 1795; d. 1 June 1872. Trained for the Roman Catholic priesthood, he emigrated to the United States in 1819, where he became in turn teacher, proof-reader, journalist, and lecturer. He had acted as casual reporter and writer in connection with several journals, and had failed in one or two journalistic ventures previous to the issue of the first number of the *New York Herald*, which he founded as an independent newspaper, 6 May 1835, price one cent. He spared no effort and expense in securing news, and laid the foundation of its subsequent enormous success. It was the first newspaper to publish the stock lists and a daily money article.

Bennett, James Gordon, American journalist: (son of the preceding): b. New York, 10 May 1841. He became managing editor of the *New York Herald* in 1866, and became its proprietor on the death of his father in 1872. In 1870 he sent Henry M. Stanley on the exploring expedition which resulted in the finding of Dr. Livingstone, and, in conjunction with the *London Daily Telegraph*, supplied the means for his journey across Africa by way of the Congo in 1874-8. He organized a system of storm prognostications of value to shipping-masters; fitted out the Jeannette Polar expedition; and in 1883 was associated with John W. Mackay in organizing the new Commercial Cable Company. He founded the *Evening Telegram* in New York, and established daily editions of the *Herald* in Paris and London. He early gave much attention to yachting, in 1866 taking part in an ocean yacht race from Sandy Hook to the Needles, Isle of Wight, which was won by his schooner *Henrietta* against two competing yachts in 13 days, 21 hours, 55 minutes. In 1870 he raced in his yacht *Dauntless* from Queenstown to Sandy

Hook, but was beaten by the *Cambria* by two hours. He resides mainly in Paris, collecting foreign news, and directing by telegraph the management and policy of his newspapers. The *New York Herald* was incorporated in 1899.

Bennett, John, American writer: b. Chillicothe, Ohio, 17 May 1865. He has published 'Master Skylark' (1892); 'The Story of Barnaby Lee' (1900).

Bennett, John Hughes, English physician: b. London, 31 Aug. 1812; d. Norwich, 25 Sept. 1875. He graduated at Edinburgh in 1837, and after four years' study in Paris and Germany settled in Edinburgh as an extra-mural lecturer. A work published in 1841, in which he recommended cod-liver oil in all consumptive diseases, first brought him into notice, and in 1848 he was made professor of the institutes of medicine in Edinburgh University—a post which he held until 1874. His health gave way in 1871, and most of his last years were spent abroad.

Bennett, Joseph M., American philanthropist: b. Juliustown, N. J., 16 Aug. 1816; d. 29 Sept. 1898. He engaged in the clothing business in Philadelphia, Pa., when 16 years old. In 1880 he gave 40 acres of ground in what is now Fairmount Park, valued at \$400,000, for a Methodist Orphanage, to the support of which he afterward largely contributed. He also established the Hays Home, and gave valuable properties to the Deaf and Dumb Institute, the University of Pennsylvania, and the Methodist Deaconesses. His property was said to be worth \$3,000,000, and it is estimated that he gave \$1,000,000 to charity. He bequeathed \$500,000 to the University of Pennsylvania for its proposed college for women.

Bennett, Mary E. (ELIZABETH GLOVER), American writer: b. Connecticut, 1841; a writer of New Haven, Conn., whose writings have been published over the pen name ELIZABETH GLOVER. They include 'Cyril Rivers'; 'Six Boys'; 'Asaph's Ten Thousand'; 'Talks About a Fine Art'; 'Family Manners'; 'The Children's Wing'; 'Jefferson Wildrider'; 'The Gentle Art of Pleasing.'

Bennett, Samuel Crocker, American lawyer: b. Taunton, Mass., 19 April 1858. He is a son of Edmund Hatch Bennett (q.v.), and in 1898 succeeded his father as dean of the law school of Boston University. He is one of the editors of 'Federal Decisions'; 'Smith's Leading Cases'; 'Benjamin on Sales'; 'Cyclopedia of Law and Procedure.'

Bennett, Sanford Fillmore, American hymnologist: b. Eden, N. Y., 1836; d. 12 June 1898. He settled in Elkhorn, Wis., in 1860, and became editor of the *Independent*. Resigning this place, he entered the 40th Wisconsin Volunteers and served with them throughout the Civil War. In 1867 he aided J. P. Webster, the composer, in preparing 'The Signet Ring,' a Sunday-school hymn-book, to which he contributed about 100 hymns. 'The Sweet Bye and Bye' was one of the first of these. Many of Mr. Bennett's hymns and songs have been published in sheets.

Bennett, William Cox, English songwriter: b. Greenwich, 14 Oct. 1820; d. Blackheath, 4 March 1895. He suggested that the bust of Longfellow be placed in Westminster Abbey, and formed a committee of 500, with the Prince of Wales at its head, to effect it. He

was the author of 'Poems' (1850); 'The Trial for Salamis' (1850); 'Endowed Parish Schools and High Church Vicars' (1853); 'Queen Eleanor's Vengeance, and Other Poems' (1856); 'War Songs' (1857); 'Songs by a Song-Writer' (1858); 'Baby May, and Other Poems' (1859); 'Our Glory Roll, and Other National Poems' (1867); 'Contributions to a Ballad History of England, etc.' (1869); 'School-Book of Poetry' (1870); 'Songs for Sailors' (1872); 'Narrative Poems and Ballads' (1879); 'Songs of a Song-Writer' (1876); and 'Sea Songs' (1878).

Bennett, Sir William Sterndale, English composer: b. Sheffield 13 April 1816; d. London, 1 Feb. 1875. He became a pupil of the Royal Academy of Music in 1826, studying under Cipriani Potter, Crotch, and Lucas, and afterward Moscheles. By the advice of Mendelssohn, whose friendship he had gained, he studied in Leipzig from 1836 to 1838, and his performances and compositions were held in high esteem by the younger German musicians, and especially by Schumann. After a period spent in teaching, conducting, and composing, he was appointed professor of music at Cambridge in 1856, and was knighted in 1871. In 1868 he became principal of the Royal Academy of Music. He was too entirely dominated by Mendelssohn's influence to do great original work. He is best known by his overtures, 'The Naiads' and 'Parisina'; his cantatas, 'The May Queen' and 'Woman of Samaria'; and his little musical sketches, 'Lake,' 'Millstream,' and 'Fountain.'

Bennigsen, Levin Augustus (Baron Von), Russian soldier: b. Brunswick, 1745; d. 3 Oct. 1826. He entered the Russian service at an early age, and distinguished himself by his bravery in the war against Poland, under the Empress Catherine II. In 1806 he was appointed to command the Russian army which went to the assistance of the Prussians. He afterward fought the battles of Eylau and Friedland. After the Peace of Tilsit he retired to his estates. In 1813 he led the Army of Poland into Saxony, took part in the battle of Leipzig, and blockaded Hamburg. He was commander-in-chief in southern Russia, but finally settled in his native country, where he died.

Bennigsen, Rudolph von, German statesman: b. Luneberg, Hanover, 1825; d. Bennigsen, 7 Aug. 1902. After Hanover became a part of Prussia he was elected to the North German Diet and the Prussian Assembly, becoming vice-president of both. Entering the German Reichstag in 1871, he became prominent as leader of the National Liberals, warmly supporting Bismarck for years, but later opposing his policy toward the Socialists. After some years spent in retirement, Bennigsen re-entered politics in 1887 and continued active until 1898, when he resigned his position as president of the province of Hanover.

Bennington, Vt., town and county-seat of Bennington County, on the Bennington & R. and the Lebanon Springs R.R.'s; 36 miles east of Troy, N. Y., and 55 miles southwest of Rutland. It contains the villages of Bennington, North Bennington, and Bennington Centre; and has large woolen and knit-goods factories; a

Soldiers' Home, a memorial battle monument, dedicated on the centennial of the admission of the State into the Union, 19 Aug. 1891; two national banks, public library, numerous churches, and graded public schools. There are valuable deposits of brown hematite ore in the town. The government consists of a town president and a board of trustees elected annually at town meetings under the charter of 1885. The town, which was named after Governor Benning Wentworth of New Hampshire, was settled in 1761, and for many years before Vermont became a State, was claimed by both New York and New Hampshire. Pop. about 9,000.

Bennington, Battle of, one of the early battles of the Revolution, fought at Bennington, Vt., 16 Aug. 1777. The army of Gen. Burgoyne, marching to the south from Canada, and causing the abandonment of Ticonderoga by Gen. St. Clair, created the greatest commotion throughout New England, since Boston was supposed to be its point of destination. Gen. Stark chanced to be at the time at Bennington, having under his command a corps of New Hampshire militia, and he determined to confront a strong detachment of the enemy sent out under Col. Baum to procure supplies. He hastily collected the continental forces in the neighborhood, and on 16 August approached the British, whom, after a hot action of two hours, he forced to a disorderly retreat. The engagement was hardly over when a reinforcement arrived, sent by Gen. Burgoyne, and the battle was renewed, and kept up several hours till dark, when the British forces retreated, leaving their baggage and ammunition. The loss of the enemy was 207 killed, 600 taken prisoners, and 1,000 stand of arms. The Americans lost only 14 killed and 42 wounded.

Benno, Saint, bishop of Meissen (son of the Count of Bultenburgh) and Apostle of the Slavs: b. Hildesheim, 1010; d. 1106. At 26 years of age he became a monk in the Benedictine convent of Saint Michael in his native town. His extraordinary virtues and learning caused his brethren to elect him abbot in 1042, but the dignity and office he resigned three months later. During the minority of Henry IV., he was appointed to the see of Meissen, and during his episcopate of 40 years he led the life of an ascetic. In the quarrel between Henry and the Saxon nobles he stood by the latter, and in consequence was led away prisoner when Henry passed through Meissen in 1075 after his victory on the Unstrut. He supported Pope Gregory VII. in the long dispute between the emperor and the Pope. He died at the advanced age of 96 years and his tomb in the Cathedral of Meissen was venerated as a shrine, until the remains were transferred to the cathedral in Munich. The Bavarians chose him as their patron saint after he was canonized by Hadrian VI. in 1523. See his 'Life' by Emser in the Bollandists for June 3d, also his 'Life' by Seyffort.

Benoit, Pierre Leopold Leonard, bē-nwā, pē-ār lā-ō-pōld lā-ō-nār, Flemish musician and composer: b. Harelbeke, Belgium, 17 Aug. 1834. He studied under Fétis. He has held the position of director of the Flemish School of Music in Antwerp since 1867, and has written a number of oratorios, cantatas, and operas. In

the first class of these compositions, his 'Lucifer,' 'The Drama of Christ,' and 'The War,' should be mentioned.

Benoît de Sainte-Maure, de saint-môr, French trouvère and chronicler: b. Touraine; fl. in the 12th century. He wrote in about 42,300 octosyllabic verses a 'Chronicle of the Dukes of Normandy' to the year 1135. To him is usually ascribed the 'Romance of Troy,' founded on the story of the siege of Troy as written by Dictys Cretensis and Dares; it was translated into the languages of western Europe. Boccaccio, Chaucer, and Shakespeare would seem to be indebted to Benoît for the story of the loves of Troilus and Briseis (Cryseyde or Cressida being originally called Briseida).

Bensel, James Berry, American poet and novelist: b. New York, 2 Aug. 1856; d. 3 Feb. 1886. He lived most of his life at Lynn, Mass., and was a contributor to magazines. He wrote 'King Kophetua's Wife' (1884), a novel; 'In the King's Garden, and Other Poems' (1886).

Benserade, Isaac de, bân-s'râd, ê-sâk dè, French poet: b. Lyons-la-Farêt, Normandy, 1612; d. Gentilly, 1691. He wrote for the stage, and composed a great number of ingenious verses for the king and many distinguished persons at court. In the first half of the reign of Louis XIV. the court and its followers patronized songs of gallantry, rondeaux, triolets, madrigals, and sonnets, containing sallies of wit, conceits, and effusions of gallantry in the affected style then prevalent. No one succeeded so well in this art as Benserade, who was therefore, by way of eminence, called *le poète de la cour*. He received many pensions for his performances and lived at great expense. Wearied at last with the life he led he retired to his country-seat, Gentilly.

Bensley, Thomas, English printer: d. 1833. He is much known for an edition of 'Lavater,' printed by him in 1789, in 5 volumes quarto, and for an edition of the English Bible between 1800 and 1815, in 7 volumes quarto. He also printed Shakespeare in 1803, in 7 volumes octavo, and in 1806 Hume's 'England' in 10 volumes folio, which is adorned with elaborate portraits and engravings on copper. He was prominent also in the construction of the machine printing-press invented by Kœnig and applied to printing the *Times* newspaper in 1814.

Benson, Arthur Christopher, English author: (son of Edward White Benson, and brother of Edward Frederic, qq.v.) b. 24 April 1862. He was educated at Eton and Cambridge. In 1885 he was appointed master of Eton College. He is the author of several volumes of poems, published in 1893, 1895, 1896, and 1900; and also of 'Memoirs of Arthur Hamilton' (1886); 'Archbishop Laud' (1887); 'Men of Might' (with Mr. Tatham); 'Fasti Etonenses' (1899); 'Life of Archbishop Benson' (1899); 'The Schoolmaster' (1902); and 'Tennyson' (in the 'Little Biographies' Series).

Benson, Carl, pseudonym of Charles Astor Bristed (q.v.).

Benson, Edward Frederic, English author: (son of Edward White Benson and brother of Arthur Christopher qq.v.) b. Wellington College, 24 July 1867. He was educated at King's College, Cambridge; worked at Athens for the British Archaeological School (1892-5), and in

Egypt, for the Hellenic Society (1895). His writings include 'Dodo' (1893), a novel of London society; 'Six Common Things' (1893); 'Rubicon' (1894); 'Judgment Books' (1895); 'Limitations' (1896); 'The Babe' (1897); 'Vintage' (1898); 'The Capsina' (1899); 'An Act in a Backwater' (1904).

Benson, Edward White, Archbishop of Canterbury: b. near Birmingham, 1829; d. Haverden, 11 Oct. 1896. He graduated at Cambridge in 1852 as a first-class and senior optime, and was for some time a master at Rugby. He held the headmastership of Wellington College from its opening in 1858 to 1872, when he was made a canon and chancellor of Lincoln Cathedral. In 1875 he was appointed chaplain in ordinary to the queen, and in December 1876 was nominated to the newly erected bishopric of Truro. Here he began the building of a cathedral (1880-7), most of the first cost, £110,000, having been gathered by his own energy. In 1882 he was translated to Canterbury to succeed Dr. Tait as primate of all England. A high-churchman, Dr. Benson was frequently select preacher at both universities, and published several volumes of sermons, a small work on 'Cathedrals,' and a valuable article on 'St. Cyprian.' A distinguished ecclesiastical lawyer and diplomatist, he gave the important judgment in the Lincoln case on ritual.

Benson, Egbert, American jurist and politician: b. New York, 21 June 1746; d. Jamaica, N. Y., 24 Aug. 1833. He was graduated at Columbia College 1765; was member of Congress 1784-8, 1789-93, and 1813-15; judge of the supreme court of New York 1794-1801; and became a judge of the United States circuit court. He wrote a 'Vindication of the Captors of Major André,' and 'Memoir on Dutch Names of Places.'

Benson, Eugene, American artist and miscellaneous writer: b. Hyde Park, N. Y., 1840. Residing in Rome, Italy, he has contributed to American magazines. He has written 'Gaspara Stampa' (1881), a biography, with selections from her sonnets; 'Art and Nature in Italy' (1882).

Benson, Frank Weston, American painter: b. Salem, Mass., 24 March 1862. He was educated at the Museum of Fine Arts, Boston, and in Paris; became a member of the Society of American Artists in 1888. He won the Hallgarten and the Clarke prizes at the National Academy of Design in 1889 and 1891; has done much in figure work with outdoor effects, but is best known for his portraits.

Bent, James Theodore, English traveler: b. Liverpool, 30 March 1852; d. London, 6 May 1897. He graduated at Oxford University in 1875, and managed excavations in Greece for the British Museums and the Hellenic Society. His publications include: 'A Freak of Freedom, or the Republic of San Marino' (1879); 'Genoa: How the Republic Rose and Fell' (1880); 'Life of Giuseppe Garibaldi' (1881); 'The Cyclades, or Life Among the Insular Greeks' (1885).

Bent, Silas, American naval officer: b. St. Louis, 10 Oct. 1820; d. 1889. He entered the navy in 1836; served in the Seminole war, and was with Commodore Glynn and Commodore Perry on several cruises to Japan. He was always especially active in survey work; on

BENT-GRASS — BENTHOS

Perry's Japan expedition he had charge of the hydrographic survey, and his excellent work became the basis of the surveys undertaken later by the Japanese government. His most important work was to delineate and describe scientifically the Kuro Shiwo, or Black Tide, the great northward-flowing stream of the Pacific, corresponding to the Atlantic Gulf Stream.

Bent-grass (*Agrostis*), a genus of grasses usually regarded as weeds except in soils which cannot produce better. Common bent-grass or purple bent (*A. vulgaris*) is a fine-leaved species with trailing stems rooting at the joints, and small thin panicles of purplish satiny flowers. It overruns dry, gravelly, sandy places with its wiry stems, and becomes a troublesome weed, only to be got rid of by pulling up early in the season before the seed is ripe, or by frequent harrowing. It is, however, sometimes sown in warrens and in places where nothing better will grow. March bent, white bent, or fiorin grass (*A. stolonifera*), has broader leaves than common bent, a much closer and larger panicle, and green or pale flowers. It is very common in low, damp places, which it overruns with its compact, trailing, rooting stems, and is a useful grass in newly reclaimed bogs or land liable to inundation. Brown bent-grass (*A. canina*) is known in the United States as Rhode Island bent-grass, and is highly prized as a lawn grass. Herd-grass (*A. cornucopia* or *dispar*) has large panicles of green flowers, which form an almost level top.

Bentang. See ERIODENDRON.

Benteen, Frederick William, American soldier: b. Petersburg, Va., 24 Aug. 1834; d. 22 June 1898. He was educated in his native state; and at the outbreak of the Civil War went to Missouri and organized a company of Union volunteers. He became first lieutenant of the 10th Missouri Cavalry, 1 Sept. 1861; promoted captain, 1 Oct. 1861; major, 18 Dec. 1862; lieutenant-colonel, 27 Feb. 1864; and colonel of the 138th United States Colored Infantry, 15 July 1865; mustered out of volunteer service 6 Jan. 1866. On 28 July 1866 he was commissioned captain in the 7th cavalry; promoted major of the 9th cavalry, 17 Dec. 1882; and retired 7 July 1888. His most brilliant service after the war was in his campaigns against the Indians.

Benthal Fauna, the abyssal or deep-sea fauna; the great assemblage of animals living at all depths below 150 fathoms in the North Atlantic, to 500 fathoms in the tropics. See also DEEP-SEA LIFE.

Bentham, George, English botanist; nephew of Jeremy Bentham (q.v.): b. near Plymouth, 22 Sept. 1800; d. 10 Sept. 1884. He was privately educated, early attached himself to botany, and having resided in southern France (where his father had an estate), 1814-26, he published in French (1826) a work on 'The Plants of the Pyrénées and Lower Languedoc.' Having returned to England he studied law, and on this subject, as well as logic, he developed original views. Finally, however, he devoted himself almost entirely to botany; was long connected with the Horticultural Society and the Linnæan Society; and from 1861 onward was in almost daily attendance at Kew (except for a few weeks occasionally), working at descriptive botany from 10 to 4 o'clock as a labor of love. Along with Sir J. D. Hooker

he produced the great work of descriptive botany, 'Genera Plantarum'; another great work of his was the 'Flora Australiensis' (in 7 volumes). His 'Handbook of the British Flora' is well known.

Ben'tham, Jeremy, English jurist and publicist: b. London, 15 Feb. 1748; d. London, 6 June 1832. After an early education at Westminster School he went to Oxford in his 13th year, taking his bachelor's degree at 15, and his master's degree at 18. He studied English law, but never appeared at the bar, being enabled by easy circumstances to devote himself entirely to literary compositions. He did not, however, publish his chief works himself. They were arranged and translated into French by his friend, Etienne Dumont, and printed partly in Paris and partly in London. Among them are: 'Treatises on Civil and Penal Legislation' (Paris 1802, 3 vols.), and 'Theory of Punishments and Rewards' (London 1801, 2 vols.). Bentham advocated a thorough correction of civil and criminal legislation. His 'Fragments on Government,' in opposition to Blackstone, appeared anonymously in 1776, and with his name, London 1823. In France his literary labors found a better reception than in England or Germany. A small pamphlet on the liberty of the press (London 1821) was addressed by him to the Spanish Cortes during their discussion of this subject; and in another ('Three Tracts Relative to the Spanish and Portuguese Affairs,' London 1821) he refuted the idea of the necessity of a house of peers in Spain, as well as, Montesquieu's proposition that judicial forms are the defense of innocence. One of his latest works was the 'Art of Packing' (London 1821), that is, of arranging juries so as to obtain any verdict desired. His previous work, 'Essay on Parliamentary Practice,' edited from the author's papers by Dumont (Geneva 1815), and translated into German, contains many useful observations. His 'Introduction to the Principles of Morals and Legislation' (London 1823, 2 vols.) treats of the principal objects of government in a profound and comprehensive manner. Zanobelli has translated Bentham's 'Theory of Legal Evidence' into Italian (Bergamo 1824, 2 vols.). Among the earlier works of Bentham was his 'Defense of Usury,' showing the Impolicy of the Present Legal Restraints on the Terms of Pecuniary Bargains' (1787). At his death Mr. Bentham bequeathed his body to be dissected for the benefit of science. A complete edition of his works, with a biography by Bowring, was published in London (11 vols. 1843). He was a man of primitive manners, unblemished character, and undoubted earnestness in the cause of the people at large. He is considered the father of the Utilitarians, or those moral political economists who view everything as it is affected by the principle of 'the greatest happiness of the greatest number.'

Benthos, the constantly or periodically submerged vegetation attached to the bottoms of seas and, to some extent, of lakes, distinguished from the floating vegetation. (See PLANKTON.) Commencing at the high-tide line and progressing toward the low-tide line the vegetation gradually becomes more abundant and luxuriant, but reaches its maximum below the low-tide mark in areas wholly submerged, in which at medium depths individual development is

greater than at greater depths. The benthos of the frigid zones are the most remarkable of the world. The leading plants of such formations are green, red, and brown algæ, eel-grass, and rockweed.

Bentinck, Lord William Charles Cavendish, English soldier and statesman (second son of the third Duke of Portland): b. 14 Sept. 1774; d. Paris, 17 June 1839. He entered the army at an early age, and served in the Duke of York's campaign in Flanders, and also in Italy with the Russian army under Suwaroff, 1799-1801. In 1803 he proceeded to India as governor of Madras, returned thence in 1805, and subsequently went to Spain, where he commanded a brigade under Sir John Moore at Corunna. In 1810 he visited Sicily as British plenipotentiary, and commander-in-chief of the English troops. The most noticeable feature of this expedition is his bestowment on the Sicilians of a constitution, which, however, was overturned on the restoration of the Bourbons. He conducted in 1813 the expedition from Sicily to Catalonia, and in 1814 took possession of Genoa on the revolt of the inhabitants from French rule. The same year he returned to England, and subsequently entered Parliament as member for Nottingham. In 1827, under Mr. Canning's administration, he was sent to India as governor-general, and held that office till 1835, when he returned to England. Among the principal events of his administration are the abolition of the practice of suttee, the repeal of the restrictions which prohibited all Europeans, except servants of the company, from settling in India, and the recognition of the liberty of the press. In 1836 he again entered Parliament as member for the city of Glasgow, but was now unable from ill health to take any active share in political matters.

Bentinck, Lord William George Frederick Cavendish, generally known as **LORD GEORGE BENTINCK**, English statesman (son of William Henry Cavendish, fourth Duke of Portland); b. 27 Feb. 1802; d. 21 Sept. 1848. He entered the army, but quitted it early to become private secretary to Mr. Canning, who had married his mother's sister. In 1827 he entered Parliament as member for King's Lynn, and continued to represent that borough for the rest of his life. Up to 1846 he was a warm adherent of Sir Robert Peel and his measures; but on the latter announcing himself in that year a convert to free-trade principles, Lord George abandoned his old ally and came forward as the zealous and indefatigable leader of the Protectionists in the House of Commons. With the assistance of Disraeli he maintained this position for two years, and though often illogical, and sometimes unscrupulous in his statements, he nevertheless commanded much attention by the vigor and earnestness of his oratory and deportment.

Bentivoglio, Cornelio, bèn-tè-vôl'yô, cor-nâl'yô, Italian ecclesiastic and poet: b. Ferrara, 1668; d. Rome, 1732. He early distinguished himself by his progress in the fine arts, literature, philosophy, theology, and jurisprudence, and was a patron of the literary institutions at Ferrara. Pope Clement XI. made him his domestic prelate and secretary to the apostolic chamber, and sent him, in 1712, as nuncio to Paris, where, during the last years of the reign of Louis XIV., he acted an important part in

the affair of the bull *Unigenitus*. The Duke of Orleans, regent after the death of Louis, was not favorably disposed toward him; the Pope therefore transferred him to Ferrara, and in 1719 bestowed on him the hat of a cardinal, and employed him at first in Rome, near his own person, then as legate *a latere* in Romagna, etc. Poetry had occupied his leisure hours. Sonnets composed by him may be found in Gobbi's Collection, Vol. III., and in other collections of his time. Under the name of **SELVAGGIO PORPORA** he translated the 'Thebais of Statius' into Italian.

Bentivoglio, Guy or Guido, gē'dō, Italian historian and ecclesiastic: b. Ferrara, 1579; d. Rome, 1644. He studied at Padua with great reputation, and afterward, fixing his residence at Rome, acquired general esteem by his prudence and integrity. He was an able politician, and his historical memoirs are valuable, especially his 'History of the Civil Wars in Flanders,' written in Italian, and first published at Cologne (1630), a translation of which, by Henry, Earl of Monmouth, appeared in 1654 (London, folio). His own 'Memoirs' and a collection of letters are reckoned among the best specimens of epistolary writing in the Italian language (an edition of which was published at Cambridge in 1727).

Bentley, Charles Eugene, American clergyman: b. Warner's, N. Y., 30 April 1841. He was educated at Monroe Institute and Oneida Seminary. In 1866 he removed to Iowa and in 1878 to Butler County, Neb., where he resided until 1890. He was ordained a Baptist clergyman in 1880 and was in charge of a church at Surprise, Neb. In 1884, he was chairman of the Nebraska Prohibition Convention, and became the unsuccessful candidate for congress, governor, and United States Senator during the next eight years. When the Prohibition party divided in 1896, he became presidential candidate of the faction known as the Liberty Party (q.v.).

Bentley, Gideon, American soldier: b. 1751; d. Constantia, Oswego County, N. Y., January 1858. He was remarkable for his longevity (107 years), and for the excellent though humble services which he rendered as a private soldier in the Revolutionary War.

Bentley, John Francis, distinguished English architect: b. Doncaster, England, 1839; d. Clapham, London, 2 March 1902. Upon the rebuilding of the great parish church in Doncaster, about 1856, Bentley was placed in the office of the clerk of the works, his architectural education practically beginning at this time. In 1862 he began practice as an architect on his own account, and his patrons from that date onward were mainly Roman Catholics. Among his lesser works are the Roman Catholic church and convent at Bocking, Essex; and the new Roman Catholic cathedral in Brooklyn, N. Y.; but the building with which his name will be inseparably associated is the Roman Catholic cathedral at Westminster, a structure of vast proportions with a nave wider than that of any church in England. Bentley left nothing in the way of design to subordinates, but designed and directed everything from the foundation to the minutest decorative feature. Bentley's death took place just as the Royal Institute of British Architects had voted to award him the royal gold medal.

Bentley, Richard, English divine, classical scholar, and polemicist: b. near Wakefield, Yorkshire, 1662; d. Cambridge, 14 July 1742. His father is said to have been a blacksmith. To his mother, a woman of strong natural abilities, he was indebted for the rudiments of his education, and in 1776 he entered Saint John's College, Cambridge. In 1682 he left the university, and became usher of a school at Spalding; a year later he took the position of tutor to the son of Dr. Stillingfleet, dean of St. Paul's. He accompanied his pupil to Oxford, where he availed himself of the literary treasures of the Bodleian Library in the prosecution of his studies. In 1684 he took the degree of A.M. at Cambridge, and in 1689 obtained the same honor at the sister university. His first published work was a Latin epistle to Dr. John Mill on an edition of the 'Chronicle of John Malela,' which appeared in 1691. It displayed so much profound learning and critical acumen as to excite the sanguine anticipations of classical scholars from the future labors of the author. Dr. Stillingfleet, having been raised to the bishopric of Worcester, made Bentley his chaplain, and in 1692 collated him to a prebend in his cathedral. He was chosen the first preacher of the lecture instituted by the celebrated Robert Boyle for the defense of Christianity. The discourses against atheism which he delivered on this occasion were published in 1694; they have since been often reprinted, and translated into several foreign languages.

In 1693 he was appointed keeper of the Royal Library at Saint James—a circumstance which incidentally led to his famous controversy with the Hon. Charles Boyle, afterward Earl of Orrery, relative to the genuineness of the 'Greek Epistles of Phalaris.' In this dispute Bentley was victorious, though opposed by the greatest wits and critics of the age, including Pope, Swift, Garth, Atterbury, Aldrich, Dodwell, and Conyers Middleton, who advocated the opinion of Boyle with an extraordinary degree of warmth and illiberality. In 1699 Bentley, who had three years before been created D.D., published his 'Dissertation on the Epistles of Phalaris,' in which he proved that they were not the compositions of the tyrant of Agrigentum, who lived more than five centuries before the Christian era, but were written by some sophist under the borrowed name of Phalaris, in the declining age of Greek literature.

Soon after this publication Dr. Bentley was presented by the Crown to the mastership of Trinity College, Cambridge, worth nearly £1,000 a year. He now resigned the prebend of Worcester, and in 1701 was collated to the archdeaconry of Ely. His conduct as head of the college gave rise to accusations of various offenses, including embezzlement of college money. The contest, lasting more than 20 years, was decided against him, a sentence, depriving him of his mastership, being passed; but Bentley's superior skill and mastery of legal forms constantly baffled all attempts to oust him. In 1711 he published a quarto edition of Horace at Cambridge, which was reprinted at Amsterdam; and in 1713 appeared his remarks on 'Collins' Discourse on Free-Thinking,' under the form of a 'Letter to F. H. (Francis Hare), D.D., by Phileleutherus Lipsiensis.' He was appointed regius professor of divinity in 1716, and in the same year issued proposals for

a new edition of the Greek Testament, an undertaking for which he was admirably qualified, but which he was prevented from executing in consequence of the animadversions of his determined adversary, Middleton. In 1726 he published an edition of Terence and Phædrus; and his notes on the comedies of the former involved him in a dispute with Bishop Hare on the metres of Terence. The last work of Dr. Bentley was an edition of Milton's 'Paradise Lost,' with conjectural emendations, which appeared in 1732, but this proved a failure. He died at the master's lodge at Trinity, and was interred in the college chapel. The German scholar, J. A. Wolf, wrote an excellent biography of Bentley; and an English biography of him was written by Monk (London, 2 vols. 1833). See also Prof. Jebb's monograph in the 'English Men of Letters Series' (1882).

Bentley, William, American clergyman: b. Boston, 1758; d. 29 Dec. 1819. He graduated at Harvard College in 1777, and was ordained pastor of a church in Salem in 1783. He was distinguished for his antiquarian learning, and collected a valuable and curious library and cabinet, which he bequeathed to the college at Meadville, Pa., and to the Antiquarian Society at Worcester. In theology he was regarded as a Unitarian, and he left several published sermons and discourses.

Benton, Angelo Ames, American clergyman: b. Canea, Crete, 1837. He graduated at Trinity College, Hartford, Conn., 1856, and at the General Theological Seminary, New York city. He was ordained in the Episcopal ministry in 1860. He was professor of Latin and Greek in Delaware College, Newark, Del., 1883-7, and professor of dogmatic theology in the University of the South, 1887-94. His chief publication has been 'The Church Cyclopædia: A Dictionary of Church Doctrine' (Phila. 1884).

Benton, Dwight, an American artist, writer and botanist: b. Norwich, N. Y., 1834; d. Rome, 8 May 1903. After close of the Civil War, in which he fought on the Northern side, he established himself in Cincinnati as a landscape painter. From there he went to Rome where he lived 25 years almost uninterruptedly. In 1895 Hawaii, before its annexation, appointed him its Consul-General to Italy. His most famous canvases are 'Tombs of Keats and Shelly,' 'Sunset in the Roman Campagna,' and 'A Gloomy Day' (*giornata de Tristezza*), owned by the King of Italy. His work, 'Flora of the Roman Campagna and Palatine' is his most important contribution to literature.

Benton, James Gilchrist, American soldier and inventor: b. Lebanon, N. H., 15 Sept. 1820; d. Springfield, Mass., 23 Aug. 1881. He graduated at West Point in 1842, and served in the ordnance department throughout his life. He was in command of the Washington Arsenal and principal assistant to the chief of ordnance during the Civil War, at the close of which he was transferred to the Springfield (Mass.) Arsenal. For signal bravery in rescuing exposed ammunition from fire, he was twice brevetted. The various models of the Springfield rifle, known as the models of 1866, 1868, 1873, and 1879, were made under his direction. He devoted himself especially to the improvement of firearms, and acquired distinction for his valuable inventions in this and other lines of his work. He refused to patent any of them, as he held that since the



THOMAS HART BENTON.

BENTON — BENTON HARBOR

government had educated him it had every right to benefit from his time and talents. He published 'Course of Instruction in Ordnance and Gunnery for the United States Military Academy' (1861; 4th ed. 1875).

Benton, Thomas Hart, American statesman: b. Orange County, N. C., 14 March 1782; d. 10 April 1858. He was the greatest of that most valuable and scarcely appreciated class, the Border State leaders, whose sympathies were with the South, and who had no feeling against slavery, yet at the cost of their influence and much personal peril opposed the political aggressions of slavery and the doctrines of disunion. Early orphaned, the eldest of a large family, after part of a course in the University of Pennsylvania he went with his mother to Tennessee as a pioneer, settling at the present Benton-town. A few years later he took up the study of law, and was admitted to the bar in 1811 under the patronage of his friend Andrew Jackson, then a judge of the Supreme Court. Elected to the legislature, he pushed through a judiciary reform bill, and one to give slaves the right of jury trial. In the War of 1812 he was aide-de-camp to Jackson, raised a volunteer regiment, was made lieutenant-colonel in the regular army, but saw no active service; meanwhile, 4 Sept. 1813, a misunderstanding over a duel of his brother's led to an affray in which the brother was stabbed, Jackson shot, and Thomas H. thrown downstairs, and the former friends were at bitter feud for many years. In 1815 he removed to St. Louis, practised law, and established a newspaper, which involved him in duels (one of which cost his opponent's life, to Benton's lasting regret); but which he used so vigorously to advocate Missouri's admission to the Union as a slave State that she elected him one of her senators on her entrance in 1820, and re-elected him every term for 30 years. During this time he stood as one of the foremost public men of his generation—a speaker of great ability and mastery of facts, a hard-headed logician and tremendous debater, of astonishing memory, unwearied industry, an iron will and physique, and a power of wit, sarcasm, and denunciation that made most men shrink from a contest with him. Being the spokesman of the Western Democrats, his policy and political feelings were coincident with Jackson's, their personal quarrel was at last arranged, and Benton became Jackson's first lieutenant and admiring champion. In every regard he supported Western interests: he secured the passage of laws for pre-emption, donation, and graded prices of lands, for throwing open the government mineral and saline lands to occupancy, and for repeal of the salt tax; advocated transcontinental exploration and post-roads, a Pacific railroad, occupation of the mouth of the Columbia, trade with New Mexico, military stations through the Southwest, amicable relations with Indian tribes, and everything conducive to opening up the West and making it prosperous. This made him invincible there till the slavery question drove him into opposition. He supported Jackson in his refusal to re-charter the United States Bank; and made a series of speeches urging the adoption of a metallic currency only, which were widely circulated, gained him the nickname of 'Old Bullion,' and had much to do with the creation of the sub-treasury scheme. When Jackson removed the secretary of the treasury,

Duane, for refusing to check out the deposits in the bank, the Senate adopted a resolution censuring him for it; Benton set about having the resolution expunged from the records, and after a protracted struggle succeeded, despite the logical absurdity of his motion, in accomplishing his purpose by a series of fervid panegyrics on Jackson. In the Nullification contest, Benton was Calhoun's chief opponent, not only as Jackson's supporter, but by conviction; and the two men of might—the chiefs of the State-Rights and Nationalist wings of the Democracy—remained deadly foes until Calhoun's death. In the Oregon boundary dispute Benton opposed the "fifty-four forty or fight" war-cry; it was dropped, but the Polk administration was glad of an excuse to drop it in order to push the Mexican war, and had no notion of diminishing the area of slavery to enlarge that of freedom. He favored the vigorous prosecution of the war, and came near being made commander-in-chief, from his close acquaintance with the territory. But from this time on, the slavery problem swallowed up every other. Benton fought Calhoun's State-Rights resolutions in retort to the Wilmot Proviso (q.v.), and they never came to a vote; but Calhoun sent them to various State legislatures to adopt and utilize for instructing their senators, and they were pushed through the Missouri legislature without Benton's knowledge. He denounced them as misrepresenting the people, canvassed his State for re-election in a long-famous series of powerful and caustic speeches, and carried his party, but was defeated by a fusion of Whigs and anti-Benton Democrats, and his senatorial service ended with 1850. He opposed the Clay compromise resolutions of that year, however (see COMPROMISE of 1850), with sarcasm still quoted. In 1852 he canvassed Missouri for election to the lower House, and was triumphantly returned. He supported Pierce for election, and in Congress till the Kansas-Nebraska bill came up. Against that he made one of his greatest speeches, and the administration thereupon ousted all his Missouri supporters, and he was defeated for re-election by the now dominant ultra-Southern sentiment in the Democratic party. The time of mediators and middle courses had gone by. He now set about writing his remarkable 'Thirty Years' View' (1854-6), a most valuable account of his senatorial experiences and the secret political history of the years 1820-50. In 1856 he ran for governor, but a third ticket in the field defeated him. In the campaign of 1856 he supported Buchanan against his own son-in-law, Frémont, as representing the party of union; but materially changed his mind before his death. In these last two years, though in extreme old age, he carried through the immense and useful labor of compiling an abridgment of the debates in Congress, from the foundation of the government to 1850, published later in 15 volumes. He also published an 'Examination of the Dred Scot Case' (1857).

Benton Harbor, Mich., a city in Berrien County, situated on the St. Joseph's River, one and a half miles from Lake Michigan; on the Cleveland, C. & C., and Père Marquette R.R.'s. It is also connected with the lake by a ship canal and thus by steamboat lines with Chicago and Milwaukee. It has a large trade in lumber, grain, and fruits, especially the latter, and has

BENTONVILLE—BENZENE

also considerable manufacturing interests, including manufactories of fruit packages, furniture, machinery, flour, vinegar, and canned fruit. Pop. (1910) 9,185.

Bentonville, Ark., a town and county-seat of Benton County, situated northwest of Little Rock; on the Arkansas & O. R.R. It is the seat of Bentonville College, and a Baptist academy; is the centre of a fruit-growing region, has some trade in fruit, tobacco, and grain. It has a large fruit-evaporating plant. Pop. about 2,000.

Bentonsville, N. C., a village in Johnston County, noted as the place of a stubborn battle during the Civil War. Here, during his march from Savannah through the Carolinas, Sherman, at the head of 65,000 National troops, encountered 24,000 Confederates under Johnston. A battle took place 18 March 1865, Johnston having come up in great haste from Smithfield, intending to surprise Sherman. The latter, however, was ready for him, and Johnston was thrown on the defensive near Mill Creek. Johnston was partially defeated and retreated to Smithfield.

Bentzel-Sternau, bënt'zël-stär'now, Count Karl Christian Ernst von, German novelist: b. Mentz, 9 April 1767; d. Mariahalden, Switzerland, 13 Aug. 1843. He is esteemed as a humorist after the manner of Jean Paul; and his satirical romances, 'The Golden Calf' (1802-3); 'The Stone Guest' (1808); 'Old Adam' (1819-20); 'The Master of the Chair,' together form a series.

Bentzon, Th., the pseudonym of Marie Thérèse Blanc (q.v.).

Benue, bën'wë, or Binue, a river of west Africa, the chief tributary of the Niger. It rises in the Bub'n Jidda hills on the east of Adamawa, flows for a short distance northwest then west to Bassama, after which its course is generally southwest to its junction with the Niger at Lokoja. Its length is about 850 miles. The source of the Benue was long unknown. Dr. Barth, who came upon the river in 1851, while traveling in Adamawa, near the confluence of the Faro, which joins it on its left bank about lat. 12° 30' E., was told that it came from the southeast, a distance of nine days' journey. In consequence of this discovery an expedition was fitted out by the British government for the purpose of exploring the Niger from its mouth upward. The exploration was made in a small steamer called the *Pleiad*, and was under the command of Dr. William Balfour Baikie. After reaching the point of confluence of the Benue with the Niger, about lat. 7° 40' N., Dr. Baikie followed the former eastward for a direct distance of about 370 miles. The point thus reached was about lat. 9° 25' N.; lon. 11° 30' E. There was sufficient depth of water, though the river was only rising, to allow a still further exploration. The natives, however, had begun to display their hostility in such a manner as made it necessary to return. The result was to show that a large, fertile, and populous tract of a region of Africa previously in a great measure unknown was accessible by means of a navigable river. A second expedition, also under Dr. Baikie, explored the same river in 1857. In 1879 a small steamer belonging to the Church Missionary Society went up the river 140 miles, and its source was discovered by Flegel in 1883.

Benvolio, bën-vō'li-o, in Shakespeare's 'Romeo and Juliet,' a friend of Romeo and nephew of Montague.

Benwood, W. Va., a town in Marshall County; on the Baltimore & O. R.R. It is the centre of a large iron-mining region and has several rolling mills and blast furnaces. Pop. (1910) 4,976.

Benzal'dehyde, or Benzo'ic Al'dehyde, a colorless, volatile oil, familiarly known as "oil of bitter almonds." Benzaldehyde does not occur in the bitter almond in nature, but is formed, when the kernels are crushed and allowed to stand in water, by the decomposition of a glucoside known as "amygdalin." It has the chemical formula $C_6H_5CO.H$, boils at 354° F., and has a specific gravity of about 1.05, and a refractive index of 1.56. Benzaldehyde is prepared, artificially, by boiling benzyl chlorid with nitrate of lead, copper, or sodium, and subsequent treatment with sodium acid sulphite, with which the benzaldehyde forms a crystalline compound that may be easily separated from the mother liquor by filtration or otherwise.

Benz'ene, an aromatic hydrocarbon discovered by Faraday in 1825, and called, by him, "bicarburet of hydrogen." It has the chemical formula C_6H_6 , and is the fundamental substance from which the extensive series of "aromatic compounds" is obtained. In 1849, C. B. Mansfield proved its existence in coal tar, and that substance now constitutes its most important commercial source. In the manufacture of benzene, coal tar is distilled at a temperature not exceeding 300° F., and the distillate is treated with caustic soda to remove phenols, and subsequently with sulphuric acid to remove basic substances. It is then re-distilled, the temperature (at least in the upper part of the still) being kept as low as 212° F., in order to prevent toluene from passing over. In order to effect a still further purification, the benzene so obtained may be cooled by a freezing mixture of ice and salt. The true benzene solidifies when thus treated, and the fluid impurities that it contains may be expelled by pressure, or by the aid of a centrifugal drier. Pure benzene is a colorless liquid, strongly refractive, boiling at about 176° F., and freezing at 43° F. It does not mix with water, but mixes readily with alcohol, acetone, glacial acetic acid, chloroform, and ether. It crystallizes in the trimetric system when solidified by cold, and dissolves iodine, phosphorus, sulphur, oils, resins, fats, and alcohols. It expands by about 0.00075 of its own bulk, per degree increase in its temperature, on the Fahrenheit scale. Its specific gravity is about 0.88, and its specific heat is 0.40. For the chemical constitution of benzene, see AROMATIC COMPOUNDS.

Benzene forms two general classes of compounds, known respectively as "addition" and "substitution" products. In forming an "addition" compound, benzene merely takes up atoms or molecules of some other substance, without parting with any of its own atoms; the new substance being simply "added" to the benzene. Benzene hexabromid, $C_6H_6Br_6$, is a good example of a benzene addition compound. It is formed by dropping bromine into boiling benzene, in direct sunlight; the hexabromid crystallizing out upon cooling. The "substitution" compounds of benzene are far more numerous

BENZIDINE

and important than the "addition" compounds, however. They are formed by replacing one or more of the typical hydrogen atoms in the benzene by an equal number of other atoms or monad radicals. The general theory of benzene substitutions is given under AROMATIC COMPOUNDS; but a few of the more important examples of such substitution products may be given here. The radical C_6H_5 (which is not capable of independent existence) is called "phenyl," and is often represented by the symbol Ph. The mono-substitution compounds of benzene, in which one atom of the hydrogen in the original benzene has been replaced by a radical (or by an atom different from hydrogen), may then be regarded as addition compounds of the radical phenyl. Thus "monochlorobenzene," $C_6H_5.Cl$, may also be regarded as chlorid of phenyl, and its formula may be written $Ph.Cl$. Benzene itself may even be regarded as hydrid of phenyl, its formula being written $C_6H_5.H$, or $Ph.H$. Carboic acid (or "phenol") is hydrate of phenyl, its formula being $Ph.OH$, the radical OH being here substituted for one atom of the hydrogen in the original benzene. Nitrobenzene, $Ph.NO_2$, is formed from benzene ($Ph.H$) by the action of nitric acid, in accordance with the equation



It is used in the arts for the manufacture of aniline (q.v.). Aniline itself is an amide of phenyl, obtained by replacing an atom of H in ammonia (NH_3) by phenyl, or by replacing an atom of hydrogen in benzene by the radical NH_2 . The formula of aniline may be written $Ph.NH_2$, and aniline may be called "amido-benzene," or "phenylamine." (See AMINE and AMIDE.) Methyl-benzene, $C_6H_5.CH_3$, in which one of the original hydrogen atoms of the benzene is replaced by the radical CH_3 ("methyl") is also an important benzene substitution compound, and is known to chemists as toluene (q.v.). That portion of the original benzene which remains intact, after a substitution, is called the "benzene residue." In a mono-substitution compound of benzene, further substitutions may be made, by replacing one or more of the hydrogen atoms in the "benzene residue" by monovalent radicals, and secondary, tertiary, and higher substitution compounds may be thus formed. The classification of the secondary substitution compounds is given under Aromatic Compounds. For the classification of higher compounds, special treatises on organic chemistry must be consulted. It may be mentioned, however, that if A, B, C and D are monad radicals, there are no less than 30 distinct substances possible, which shall all have the same general formula $C_6H_5.ABCD$. This fact illustrates the exceeding complexity of the general theory of benzene substitution compounds. The full theory is even more complex than this example indicates, however, for it often happens that the hydrogen in a substituted radical can be replaced by another radical, as well as the hydrogen of the "benzene residue." Thus in methylbenzene (or toluene), $C_6H_5.CH_3$, the radical OH may be substituted for one of the hydrogen atoms. If the hydrogen so displaced occurs in the "benzene residue," the resulting compound will be "cresol," $C_6H_4(OH).CH_3$, a substance which (since it is a di-substitution compound) can exist in three isomeric forms. If, on the other hand, the OH takes the place of

one of the hydrogen atoms of the "methyl" radical, the resulting compound will be "benzyl alcohol," $C_6H_5.CH_2(OH)$.

When a primary amine of the fatty series is acted upon by nitrous acid (HNO_2), the NH_2 group of the amine is replaced by OH, with the formation of an alcohol; but when nitrous acid acts upon aromatic amines, the products are quite different, and are known as "diazocompounds." Thus when nitrous acid acts upon aniline nitrate, a compound having the formula $C_6H_5.N_2.NO_3$, and known as "diazobenzene nitrate," is formed. This is regarded by chemists as a compound of the hypothetical monovalent radical $C_6H_5-N \equiv N$. When the free affinity of this radical is saturated by the addition of phenyl (C_6H_5), the resulting compound, $C_6H_5.N_2.C_6H_5$, is known as "azobenzene," or as "benzene-azo-benzene." Azobenzene may be prepared by heating nitrobenzene with a solution of $SnCl_2$ in aqueous caustic soda. It is deposited from a solution in benzene in the form of bright red trimetric plates, and owes its importance largely to the fact that aniline yellow, $C_6H_5.N_2.C_6H_4(NH_2)$, is one of its derivatives.

Benzene is an exceedingly inflammable substance, burning with a luminous flame and the generation of a great amount of heat. It is volatile, and its vapor forms a dangerously explosive mixture with air, when present in any considerable quantity. Mansfield, mentioned above as having first demonstrated its existence in coal tar, lost his life, on 25 Feb. 1855, while experimenting with a considerable quantity of benzene, through the mass accidentally taking fire. Benzene may be formed synthetically by heating acetylene gas (C_2H_2) to dull redness in a glass tube. Polymerization occurs, and, among numerous other substances, benzene is formed in accordance with the equation $3C_2H_2 = C_6H_6$. In works on chemistry, benzene is often called "benzol." (Compare BENZENE.)

This product is so widely employed in the industry of the aniline dyes that chronic poisoning is by no means uncommon. It is usually breathed as vapor in the vat rooms, and causes, after some exposure, dizziness in the head, ringing in the ears, nausea and vomiting, coughing, and sleepiness, which latter may deepen to unconsciousness, somewhat resembling the narcosis caused by breathing chloroform. In some instances there are blood changes, with cyanosis and death. Treatment by fresh air, oxygen, free diuresis, catharsis and diaphoresis, and if the blood changes are marked, infusion of physiological salt solution may be necessary.

Benzidine, an important substance belonging to the benzene (or aromatic) series, and used in the arts for the manufacture of Congo red, chrysamin, and other so-called "coal-tar colors." The coloring matters derived from benzidine have the unusual and valuable property of dyeing cotton without the use of a mordant to fix them upon the fibre. Benzidine has the formula $H_2N.C_6H_4.C_6H_4.NH_2$, and is prepared, commercially, by heating nitrobenzene (see BENZENE) with caustic soda and zinc dust, and subsequent treatment with hot dilute hydrochloric acid. Pure benzidine crystallizes in silvery scales which melt at $252^\circ F.$, and boil at a temperature probably above $700^\circ F.$ It is easily soluble in alcohol and ether; it also dissolves readily in hot water, but is almost insoluble in cold water.

BENZINE — BENZYL

Ben'zine, the commercial name for a mixture of the lighter and more volatile hydrocarbons that pass off in the earlier stages of the distillation of crude petroleum. It is essentially different from benzene (q.v.), the latter being a definite chemical substance, belonging in the group of Aromatic Compounds (q.v.); while "benzine" is a more or less indefinite mixture of hydrocarbons that chiefly belong to the paraffin series. Benzine differs but little from naphtha and gasoline, such slight differences as exist being due to variations in the proportions in which the constituent hydrocarbons are present. Benzine is a colorless, mobile liquid, very volatile and inflammable. It is valuable as a solvent for fats, oils, and resins, and is much used about the household as a cleansing agent. Its vapor, when mixed with air, is highly explosive, and serious accidents are common, as the result of using it in the vicinity of lighted lamps or tobacco pipes, or near stoves in which fires are burning. In printing offices it is used for cleaning type, and for removing ink from press rolls. It is also used in large quantities for enriching illuminating gas. Benzine is much lighter than water, and will not mix with it. It boils at from 160° to 190° F.

Poisoning by benzine is rare. The vapor has been used, combined with chloroform and ether, for purposes of narcosis, but it is questionable if it will ever be very popular. Instances of sudden death following the prolonged breathing of benzine vapor have been reported.

Benzo'ic Acid, an organic acid, belonging in the aromatic series, and having the formula $C_6H_5.COOH$. It occurs in benzoin gum, and in certain other resins and balsams. It may be obtained also from the hippuric acid that occurs in the urine of the horse and other herbivorous animals, by boiling that acid with concentrated hydrochloric acid. Benzoic acid is used as a mordant in calico printing, and in the manufacture of aniline blue. It is also used in medicine, and as a preservative agent for anatomical specimens. The benzoic acid that is used for medical purposes is obtained by the direct distillation of benzoin gum over a sand bath, at a temperature of about 340° F. When so prepared, the acid has a pleasant, vanilla-like odor, which is imparted to it by a trace of an aromatic oil that comes over with it from the gum. For most of the purposes for which it is used in the arts, benzoic acid is formed by oxidizing benzyl chlorid with dilute nitric acid.

Benzoic acid dissolves in hot water, but crystallizes out, upon cooling, in needles or pearly prisms. It is soluble in ether, alcohol, and benzene. It melts at 250° F., boils at 480° F., and may be sublimed at intermediate temperatures. Its salts are called "benzoates."

In medicine benzoic acid and its salts, the benzoates (sodium, ammonium, lithium), are widely employed for diseases of the bladder and of the mucous membranes of the lungs. They are also used as intestinal germicides. Benzoic acid has marked bactericidal properties, and may be used for sterilizing purposes. Taken into the intestines it prevents excessive bacterial decomposition; absorbed into the blood it is partly broken up, and in the kidneys is eliminated in part as hippuric acid, rendering the urine acid. It is therefore useful in alkaline fermentations of the urine, particularly in cystitis, pyelitis, etc. Benzoic acid is partly eliminated by the lungs,

here acting to increase the amount of mucus, it is therefore used to loosen the mucus in tight coughs. As a parasiticide, benzoic acid is very valuable in scabies. Benzoates are practically useless in gout.

Benzo'ic Al'dehyde. See **BENZALDEHYDE**.

Ben'zoin, -zo-in, an aromatic compound, soluble in hot alcohol, and crystallizing in colorless, six-sided prisms having the formula $C_6H_5.CH(OH).CO.C_6H_5$. Benzoin is best prepared by acting upon pure benzaldehyde with a hot alcoholic solution of cyanide of potassium. Upon cooling, the benzoin separates and may be removed by filtration. The action of the cyanide is not known, because the chemical change involved in the foregoing process of manufacture appears to consist merely in the uniting of two molecules of benzaldehyde to form a single molecule of benzoin.

Ben'zoin Gum, -zo-in, or **Gum Benjamin**, a reddish brown resin that exudes from the tree *Styrax benzoin*, which grows in Sumatra, Java, and other parts of the East. It is a mixture of various resinous substances, together with free benzoic acid. Cinnamic acid is also present in the free state in many cases, but it is absent from the Siamese gum. Benzoin gum has a pleasant odor when burned, and for this reason has been much used for incense, and in making pastilles. It has antiseptic properties, and preparations of it are used as a dressing for wounds, and in the manufacture of court-plaster. Benzoin is also administered internally, especially in asthma and other pulmonary affections, and chronic catarrh. It is readily soluble in alcohol, and when the tincture so formed is dropped into water, it forms a white, milky fluid, which is used in France as a cosmetic, under the name "*lait virginal*." The gum is obtained from the styrax-tree by making incisions in the bark, through which the resin oozes. It is allowed to harden by exposure to the air before removal. The best gum is obtained during the first three years of the tree's life, though a good quality may be had for seven or eight years subsequently. The Siamese gum is esteemed more highly than that from Sumatra.

Benzol. See **BENZENE**.

Benzoni, **Girolamo**, bèn-zō'nē, jē-rō-lā'mō, Italian traveler: b. Milan, 1519; d. after 1566. He went to Spanish-America in 1542, visited the principal places then known, and frequently joined the Spaniards in raids on Indian settlements; and after returning to Italy (1556) published a narrative of his adventures, 'History of the New World' (Venice 1565).

Ben'zoyl, -zo-il, in chemistry, the monovalent radical $C_6H_5.CO$. Benzoyl cannot exist in the free state, but it occurs in the combined state in many organic substances. Benzaldehyde (or oil of bitter almonds), $C_6H_5.CO.H$, may be regarded as its hydrid, and benzoic acid, $C_6H_5.COOH$, as its hydrate.

Ben'zyl, the monovalent organic radical $C_6H_5.CH_2$, which does not exist in the free state, but which has numerous important compounds. Toluene (q.v.) is its hydrid. Benzylamine, $C_6H_5.CH_2.NH_2$, is derived by substituting benzyl for one of the hydrogen atoms in ammonia, by heating benzyl chlorid with alcoholic ammonia. Benzyl chlorid, which is

BEOTHUK — BÉRANGER

used as a source of 'oil of bitter almonds' ('benzaldehyde') and of benzoic acid, has the formula $C_6H_5CH_2Cl$, and is obtained by passing chlorine into cold toluene, in direct sunlight. Benzyl alcohol, $C_6H_5CH_2(OH)$, is the hydrate of benzyl, and is obtained by the action of an alcoholic solution of potash upon benzaldehyde.

Beothuk, bā'ō-thūk, a linguistic stock of North American Indians, habitants of the region of the Exploits River in northern Newfoundland, and believed to have been limited to a single tribe, the last known survivor of which died in 1829. The Beothuks painted their bodies and their property with red ochre, and from this circumstance their stock and tribal name was derived. They were also known as the Goodnight Indians, from the incorrect translation of a Micmac word that sounded like Beothuk. It is not known whether the Beothuks became extinct by reason of wars and famine or by absorption among other tribes.

Beowulf, bā'ō-wūlf, an Anglo-Saxon epic, the only manuscript of which belongs to the 8th or 9th century, and is in the Cottonian Library (British Museum). From internal evidence it is concluded that the poem in its essentials existed prior to the Anglo-Saxon colonization of Britain, and that it must be regarded either as brought to Britain by the Teutonic invaders, or as an early Anglo-Saxon translation of a Danish legend. From the allusions in it to Christianity, however, it must have received considerable modifications from its original form. It recounts the adventures of the hero Beowulf, especially his delivery of the Danish kingdom from the monster Grendel and his equally formidable mother, and, lastly, the slaughter by Beowulf of a fiery dragon, and his death from wounds received in the conflict. The character of the hero is attractive through its noble simplicity and disregard of self. The poem, which is the longest and most important in Anglo-Saxon literature, is in many points obscure, and the manuscript is somewhat imperfect.

Bibliography.—Morley, 'English Writers,' Vol. I. (1887); Ten Brink, 'Early English Literature' (1883); translation by Garnett (1885); English prose translation by Tinker (1892).

Beppo, a satirical poem on Venetian life by Byron, published in 1818, and named for the chief figure. In Auber's opera, 'Fra Diavolo,' is a character of the same name.

Beppu, bēp'poo, Japan, a bathing place and seaport on the Island of Kyushu, famed for its hot alkaline baths.

Béranger, Pierre Jean de, bā-rān-zhā, pē-ār zhōn dē, national poet of France: b. Paris, 19 Aug. 1780; d. there, 16 July 1857. His father was a restless and scheming man, and young Béranger, left in a great measure to himself, ran a great chance of spending his life as a gamin and vagabond in the streets of Paris. A few days after the destruction of the bastille he was conveyed to Peronne and placed under the charge of an aunt who kept a tavern, and to whom for a time he acted as waiter. At the age of 14 he was apprenticed to M. Laisnez, a printer in Peronne, but after remaining in that employment for some time, was suddenly summoned to Paris by his father, who wished

his assistance. The improvidence and prodigality of his father was constantly involving them in difficulties, and Béranger, with as yet no settled vocation in life, was enduring all the hardships and privation which men of genius in a similar position to himself have frequently had to encounter before the recognition of their talents. He had now, besides making an unsuccessful attempt in the drama, produced a number of poems, including his 'Roger Bontemps,' 'Le Grenier,' 'Les Gueux,' and 'Le Vieil Habit.' Some of these were sent by him in 1804 to Lucien Bonaparte, in the hope thereby of obtaining some patronage or assistance. In this, probably the only application he ever made for aid in the course of a long life, Béranger was not disappointed. Lucien sent for him, encouraged him to proceed in his poetical career, and made over to him his own income as member of the French Institute. He was afterward employed in editing the 'Annales du Musée,' and in 1809 received an appointment as clerk in the office of the secretary to the university. Many of his songs had now become extremely popular and in 1815 the first collection of them was published. A second collection was published in 1821, but Béranger had made himself extremely obnoxious to the Bourbon government by his satires on the established order of things; and in addition to being dismissed from his office in the university, he was prosecuted and sentenced to three months' imprisonment and a fine of 500 francs. A third collection appeared in 1825, and a fourth in 1828, which last publication subjected him to a second state prosecution, an imprisonment of nine months, and a fine of 10,000 francs. Nothing, however, could daunt his spirit, and in prison he still continued to busy himself in the composition of his songs and lyrical satires upon government. In 1833 he published his fifth and last collection, which contains some of the most powerful effusions of his genius. The concluding years of his life were spent in a dignified retirement and he received the honor of a public funeral, at which the most eminent men of France, both of the world of literature and politics, attended.

The great attraction of Béranger's songs is the unequalled grace and sprightliness which they display, combined with great descriptive powers, much comic humor, and occasional bursts of indignation and invective when some social or political grievance is denounced. They are sometimes also, it must be admitted, marked by a tendency to levity and looseness of morals, but in this respect they partake eminently of the French character. No one, indeed, was more thoroughly French than Béranger, and the glory of his beloved *patric*, as paramount to all other considerations, appears constantly as the inspiring genius of his poetry. The intense nationality of his songs constitutes one of their principal charms, and in this respect he bears some resemblance to Thomas Moore. He has sometimes been called the Burns of France, but though like him essentially a poet of the people, he falls far beneath the pathos and depth of feeling displayed by the Ayrshire Bard in depicting the passion of love. In private life Béranger was the most amiable and benevolent of men, beloved by his friends alike for his social qualities and kindness of heart, while his charities were so numer-

ous and extensive as often to exceed the bounds of prudence. See Janin, 'Béranger et son temps' (1866); Sainte Beuve, 'Portraits contemporains'; Nivalet, 'Souvenirs historiques et étude analytique sur Béranger et son œuvre' (1892).

Berar, bā-rār', or the **Hyderabad Assigned Districts**, a commissionership of India, in the Deccan, south and west of the central provinces and north of Hyderabad, touching Bombay territory on the west; with an area of 17,718 square miles. It consists chiefly of a fertile plain bordered on the north and south by low ranges of hills. It is intersected by the Purna, and is partly bounded north and south by the Wardha and Penganga flowing east to the Godavari. It has a fertile soil, which produces much good cotton and millet, the best wheat in India, as well as oil-seeds and other produce. The rainfall is regular, and this province is in the position of being able to export food to other parts of India. It is intersected by the railway from Bombay to Nagpur, and ultimately to Howrah, opposite Calcutta. After being ruled by independent sovereigns, it was added in the 17th century to the Mogul empire, and latterly became part of the Nizam's dominions (Hyderabad), to which it still in a sense belongs. In 1853 it was assigned or handed over to the British authorities to provide for the payment of the body of troops which the Nizam had been previously bound to furnish in time of war for the Indian government. A new treaty was concluded in 1860 by which certain territorial alterations were brought about, and a considerable debt due by the Nizam was canceled. The province has greatly prospered under British rule. It consists of six districts: Ellichpur, Amraoti, Akola, Buldana, Basim, and Wun. The largest towns are Ellichpur and Amraoti (Oomrawuttee). Berar is under the administration of a revenue and fiscal commissioner superintended by the resident at Hyderabad. There is also a judicial commissioner, who superintends the working of the courts of justice. The surplus revenue, after the expenses of administration and the cost of the Hyderabad contingent of troops are defrayed, is handed over to the government of the Nizam.

Berard, Augusta Blanche, American educator and historical writer: b. West Point, N. Y., 29 Oct. 1824; d. 1901. She was the daughter of a former professor at West Point Military Academy, and her life was spent mainly in teaching. She was the author of school histories of the United States and England; 'Spanish Art and Literature'; 'Reminiscences of West Point in the Olden Time.'

Berard, bā-rār, Frédéric, French physician: b. Montpellier, 8 Nov. 1789; d. there, 16 April 1828. When only 20 years of age he wrote a thesis entitled 'Theory of Natural Medicine, or Nature Considered as the True Physician, and the Physician as an Imitator of Nature.' He afterward went to Paris, where he was engaged to write in the 'Dictionary of Medical Science.' In 1816 he returned to Montpellier as professor of therapeutics in a private course of lectures to the medical students of the college. At this period he published a work explanatory of the 'Doctrines of the Medical School of Montpellier.' With Rouzet, he pub-

lished Dumas' work on 'Chronic Diseases,' with instructive commentaries. In 1823 he also published in Paris his work on 'The Relations of the Physical and the Moral Organism, as a Key to Metaphysics and the Physiology of Mind.' In this he explains his own views of human nature and the principles of life, in opposition to the views of Cabanis. He also took occasion to publish at the same time, a manuscript letter of Cabanis, on 'Primary or Final Causes,' accompanied by numerous annotations.

Berat, bā-rāt', a town of Albania, on the river Beratinos, the ancient Apsus. It is the seat of a pashalic and Greek archbishopric, and was taken by Ali Pasha from his rival Ibrahim. Amurath II. captured Berat, and his troops held it notwithstanding a desperate attempt by Scanderbeg with a strong body of Italian auxiliaries to retake it. Pop. 12,000.

Béraud, Jean, bā-rō, zhōn, French painter of great power: b. St. Petersburg, Russia, 1849. After serving with distinction in the French army during the Franco-Prussian war he became a pupil of Bonnat. His subjects are usually chosen from Parisian life. His latest works have been modernized scenes from the New Testament. 'La Madeleine' represents a Parisian harlot at the feet of Christ in a Paris restaurant; the scene of the 'Descent from the Cross,' is Montmartre overlooking Paris, with a group of working men and women.

Beraun, bā-row'n', a town of Bohemia, 18 miles to the southwest of Prague, on the river Beraun, with manufactures of cotton, sugar, etc.

Berbe, a west African, much-spotted genet (*Gemetta pardina*). See GENET.

Berber, a town of Nubia, on the right bank of the Nile, below the confluence of the Atbara. It is a station on the route from Khartum to Cairo, and a point to which caravans go from Suakin on the Red Sea. In the course of Gen. Graham's operations against Osman Digna in 1885, a railway was projected from Suakin to Berber, and the work was actually begun, but was ultimately abandoned when military protection was taken away. Pop. (estimated) 10,000.

Berbera, the chief port and town of British Somaliland, on the African coast, of the Gulf of Aden and south of Aden. It has a small but well-sheltered harbor and a long pier; a European quarter with stone houses and warehouses, and a native quarter laid out with broad streets but consisting chiefly of huts or sheds. There is a considerable export trade in the products of the country, such as hides and skins, gums, ostrich feathers, ghee, sheep, goats, and cattle; rice, millet, dates, cottons, tobacco, etc., being imported. The traffic is chiefly with Aden. The population is perhaps 5,000, increased to 30,000 during the trading season. The Somaliland Coast Protectorate extends along the coast for about 400 miles and inland for about 200, the area being about 80,000 square miles. Besides Berbera it contains also the ports of Zeilah and Bulhar. It was acquired in 1884, and is administered by a political agent and a consul. A number of Indian troops are stationed in the territory. The trade is of some importance and is increasing.

BERBERINE — BEROHET

Berberine, a poisonous alkaloid discovered by Buchner in 1837 in the root of the common barberry, and now known to exist in many other plants also. It crystallizes, ordinarily, in yellow, silky needles, having the composition $C_{20}H_{17}NO_4 + 4\frac{1}{2}H_2O$; but when thrown down from solution in alcohol the needles are said to be red — probably from the absence of water. Berberine forms numerous salts, and is used to a considerable extent in medicine, occurring in notable quantities in preparations of hydrastis. The alkaloid itself is soluble in from four to five parts of water at ordinary temperatures, and is also moderately soluble in alcohol; but it is insoluble in both ether and chloroform.

Berberis, the generic name of the barberry (q.v.).

Berbers, the name of a people spread over nearly the whole of northern Africa. From their name the appellation Barbary is derived. They are considered the most ancient inhabitants of the country. Their different tribes are scattered over the whole space intervening between the shores of the Atlantic and the confines of Egypt; but the different branches of Atlas are their principal abode; while to the south they extend to the Soudan. The chief branches into which they are divided are: the Amazirgh, Amazigh, or Mazigh, estimated to number from 2,000,000 to 2,500,000, and who inhabit Morocco. They are for the most part quite independent of the Sultan of Morocco, and live partly under chieftains and partly in small republican communities. Second, the Shillooh or Shellakah, who number about 1,450,000, and inhabit the south of Morocco. They practise agriculture and carry on some manufactures. They are more highly civilized than the Amazirgh. Third, the Kabyles in Algeria and Tunis, who are said to number about 1,000,000; and fourth, the Berbers of the Sahara, who inhabit the oases, and consequently live for the most part at wide intervals from each other. Among the Sahara Berbers the most remarkable are the Beni-Mezâb and the Tuareg. To these we may also add the Guanches of the Canary Islands, now extinct, but undoubtedly of the same race. The Berbers generally are about the middle height; their complexion brown, and sometimes almost black, with brown and glossy hair. Individuals of fair complexion and light hair and even with blue eyes are said to be not uncommon among them. They are generally thin, but extremely strong and robust, and their bodies are beautifully formed. The head of the Berber is rounder than that of the Arab, and the features shorter, but of an equally marked character, although the fine aquiline nose, so common among the latter, is not often seen among the Berbers. The language of the Berbers is said to have affinities with the Semitic tongues. Such of them as mingle with the Arabs speak or understand Arabic; but those who dwell in the interior of the mountains understand no other language than their own. The Berbers often leave their mountains to plunder travelers on the plain. They generally dwell in huts, or rude houses, the latter rectangular, with two gable ends, covered with thatch and entered by a low and narrow door. These dwellings are often built in little groups, scattered about in the valleys and upon the sides of the mountains, and in some parts each

group of huts is situated in the midst of a plantation, with a portion of ground laid out as a kitchen-garden. Although the Berbers have always lived in ignorance, and have had but little connection with civilized nations, they are remarkably industrious. By working the mines in their own mountains they produce lead, copper, and iron. With the iron they manufacture gun-barrels, implements of husbandry, and many rudely formed utensils. They understand the manufacture of steel, from which they make knives, swords, and other instruments, not very elegant in form, but of good quality. They likewise make gunpowder for their own use, and this powder is said to be of very superior quality. One of their articles of commerce is a species of black soap, which they make with olive-oil and soda obtained from sea-weed. The tribes inhabiting the borders of the plains and some of the great valleys breed sheep and cattle in considerable numbers. Their sheep are small and yield very little wool. They have likewise numerous herds of goats, which supply them with milk, and of the flesh of which they are very fond. Their cows and oxen are of a small species, but their asses and mules are much esteemed.

Berbice, bër-bēs', a district of British Guiana, intersected by the river Berbice. It extends from the river Abary on the west to Corentyn River on the east, about 150 miles along the coast, the boundary inland not being fixed. The chief town is New Amsterdam; pop. about 9,000. The principal productions are sugar, rum, cotton, coffee, cocoa, and tobacco. The coast is marshy and the air damp. Berbice came finally into British possession in 1815, having previously belonged to the Dutch. Till 1831 it formed a separate colony from Demerara and Essequibo. Pop. about 52,000. See GUIANA.

Berbice, a river of British Guiana; flows generally northeast into the Atlantic. It is navigable for small vessels for 165 miles from its mouth, but beyond that the rapids are numerous and dangerous.

Berchem, bër-ēm, or **Berghem**, Nikolaas, Dutch painter: b. Haarlem, 1624; d. there, 18 Feb. 1683. Having studied under his father and Van Goyen, Weenix the elder, and other masters, he spent several years in Italy, where he soon acquired an extraordinary facility of execution. His industry was naturally great, and his innumerable landscapes now decorate the best collections of Europe. The leading features of Berchem's works, besides the general happiness of the compositions, are warmth and coloring, a skilful handling of lights, and a mastery of perspective. His etchings are also highly esteemed. See Buxton and Poynter, 'German, Flemish and Dutch Painting' (1881).

Berchet, bār-shā', Giovanni, Italian poet and prose writer: b. Milan, 23 Dec. 1783; d. 1851. He was a friend of Manzoni and Silvio Pellico. In 1826 he became a frequent contributor to a liberal journal at Milan, called the *Conciliatore*. When this was suppressed and its contributors cast into prison or exiled by the Austrian government, Berchet settled in Geneva. At the time of his death he was a member of the Sardinian parliament. His writings include: 'Profugi di Praga'; 'Romanze';

(Fantasie' (1820). His collected poems appeared in 1863, with biographical sketch.

Berchta, bĕrĕ'ta, a female hobgoblin, in the folk lore of southern Germany, of whom naughty children are much afraid. Her name is connected with the word bright, and originally she was regarded as a goddess of benign influence.

Berchtesgaden, bĕrĕ-tĕs-gä'dĕn, a village of Bavaria, situated in a most picturesque and much-visited region, about 12 miles south of Salzburg, on the Achen, or Alm, a stream which issues from the beautiful lake called the Königssee. It lies on a mountain slope surrounded by meadows and trees, consists of well-built houses, and has a fine old abbey, now a royal residence; the abbey church, with fine Romanesque transepts of the 12th century; a royal villa, etc. Wood-carving is extensively carried on, and there is an important salt mine. It is the principal settlement in the district of the same name.

Berck, bärĕk, France, a bathing resort on the English Channel, an hour's ride south from Boulogne. It is the terminus of a railway, and has an excellent beach, a kursaal and two hospitals for children.

Berckheyde, bĕrk'hĭ-dĕ, **Gerrit**, Dutch painter: b. Haarlem, 1638; d. 1698. He was a younger brother of Job Berckheyde and with him was employed at the court of the Elector Palatine. Among his most important works are: 'View of Amsterdam'; 'View of Cologne'; 'View of Heidelberg Carlo.'

Berckhyde, Job, Dutch architectural and genre painter: b. Haarlem, 1630; d. 1693. He was a pupil of Jacob de Wet and Franz Hals and was accepted as master in the Haarlem Guild in 1654. Of the brothers Berckhyde Job is the finer artist. Some of his most famous paintings are: 'Joseph's Brethren in Egypt' (1669); 'Interior of Old Exchange at Amsterdam' (1678); 'Courtesan's Room'; 'Winter Landscape'; 'Interior of Haarlem Cathedral'; 'Artist's Portrait.'

Bercy, bĕr-sĕ, formerly a village on the Seine (here crossed by a suspension bridge), but since 1860 forming part of the southeastern quarter of Paris. The Parisian wine merchants have here their stores of wine, spirits, etc., and there are several important tanneries, sugar-refineries, and paper-mills. A large palace, Le Grand Bercy, was built by Leveau at the close of the 17th century.

Berdiansk, bĕr-dyānsk', a seaport of southern Russia, in the government of Taurida, on the northern shore of the Sea of Azof. It contains many handsome houses, arranged in spacious streets, and has a good anchorage, sheltered on all sides except the south. It is the chief entrepôt for the surrounding governments, and exports large quantities of grain, oil-seeds, and wool. It has also a large inland trade in wood, coal, fish, and salt, the last obtained from apparently inexhaustible mines in the vicinity.

Berditchiev, bĕr-dĕ'chĕf, a city of European Russia, in the government and 129 miles southwest of Kiev. It is an ill-built place, mainly Jewish, but contains several churches and synagogues, and a large Carmelite convent, in the church of which is an image of the Virgin

Mary, the object of pilgrimages. It carries on a considerable trade in corn, wine, cattle, honey, wax and leather.

Berea, Ky., town in Madison County; on the Louisville & N. R.R., 41 miles southeast of Lexington. It is the centre of a large agricultural section and is the seat of Berea College (q.v.), founded in 1853. Pop. about 1,300.

Bere'a, Ohio, a village in Cuyahoga County, on several railroads; 13 miles southwest of Cleveland, with which, and Elyria and Oberlin, it is connected by electric lines. It was founded in 1829; is lighted by natural gas and electricity; has extensive quarries of sandstone (Berea grit); and is the seat of Baldwin University, German Wallace College (both Methodist Episcopal), and a German orphan asylum. Pop. (1910) 2,609.

Berea College, a co-educational, non-sectarian institution, in Berea, Ky.; organized in 1855. It has 73 members in its faculty, and some 1,221 students. Its building and grounds are valued at \$150,000, and its library contains 24,000 volumes. The distinguishing feature of the college is its work in the southern mountain region, where it carries on, through traveling libraries, social settlements, and lectures, a very valuable kind of university extension.

Berea Grit, a variety of sandstone, great deposits of which are found at Berea, Ohio. It is widely famous for its evenness of texture, and color, and exemption from the impurities that would deteriorate its marketable value. See CARBONIFEROUS SYSTEM.

Bere'ans, in modern Church history an insignificant sect of dissenters from the Church of Scotland, founded by Rev. John Barclay (1734-98) in 1773. They take their title from, and profess to follow the example of, the ancient Bereans (see Acts xvii. 10-13) in building their system of faith and practice upon the Scriptures alone, without regard to any human authority whatever. They agree with the great majority of Christians, both Protestants and Roman Catholics, respecting the doctrine of the Trinity, which they hold as a fundamental article of the Christian faith; but differ from the majority of all sects of Christians in various other important particulars. For instance, they say that the majority of professed Christians stumble at the very threshold of revelation by admitting the doctrine of natural religion, natural conscience, etc., not founded upon revelation or derived from it by tradition. With regard to faith in Christ, they insist, that as faith is the gift of God alone, so the person to whom it is given is as conscious of possessing it as the being to whom God gives life is of being alive, and therefore he entertains no doubts either of his faith or his consequent salvation through the merits of Christ, who died and rose again for that purpose. Consistently with the above definition of faith, they say that the sin against the Holy Ghost is simply unbelief. Their mode of practice and Church government differs but little from those of many other dissenting sects.

Berendt, bā'rent, **Karl Hermann**, German ethnologist: b. Dantzic, 1817; d. 1878. After studying medicine he began to practise in Breslau, where he lectured in the university. In 1851 he went to Nicaragua and thence to Vera

BERENGAR—BERENICE

Cruz, where he devoted some years to ethnological study and research. He subsequently traveled in Yucatan and Guatemala, making a careful study of Mayan dialect. He published 'Analytical Alphabet of the Mexican and Central American Languages' (1869); 'Los escritos de Don Joaquin Garcia Icazbalceta' (1870); 'Los trabajos linguisticos de Don Pio Perez' (1871); 'Cartilla en lengua Maya' (1871).

Berengar, bā-rēn-gār, two kings of Italy in the 9th and 10th centuries. **BERENGAR I.**, son of the Duke of Friuli by a daughter of Louis-le-Debonnaire, during the confusion which followed on the dissolution of the empire of Charlemagne, laid claim to the crown of Italy, and after a civil war obtained it in 888. At a later period, having been invited by Pope John X. to repel the Saracens who were devastating the south of Italy, he was crowned emperor of Rome. His warlike expeditions had generally been fortunate, and his internal government was generally acceptable to his subjects; but his nobility, jealous of his authority, stirred up a new competitor for the throne in the person of Rudolf II., who invaded Italy in 921, and ultimately obliged Berengar to take refuge in Verona, where he was assassinated in 924. **BERENGAR II.**, nephew of the former by a daughter, was at first Marquis of Ivrea, while the throne of Italy was occupied by Hugo, count of Provence, a tyrant who had incurred the enmity of almost all the great feudal lords of the kingdom. Berengar, taking advantage of this feeling, put himself at the head of a force collected in Germany in 945, and was almost universally welcomed. Hugo abdicated in favor of his son Lothario, who reigned nominally for a few years, and was succeeded in 950 by Berengar, in whom all the powers of the government had previously centred. A quarrel with the Emperor Otho in the following year deprived him of his throne, but he was permitted to resume it on agreeing to acknowledge Otho as his liege lord. In a second quarrel he was not allowed to escape so easily. After losing his territories he shut himself up in the fortress of St. Leo, and defended himself bravely till famine compelled him to submit. He was imprisoned at Bamberg, and died there in 966.

Berengaria, bā-rēn-gā-rī-a, the queen of Richard I. of England; d. Le Mans, about 1230. She was a daughter of Sancho VI. of Navarre and was married to Richard at Limasol in Cyprus, 12 May 1191. She remained at Acre while the king was warring with the Saracens and resided in Poitou during his imprisonment in Germany. She became estranged from him soon after his release and seems never to have joined him again. She was buried at Espan in the Church of Pietas Dei, which she had founded.

Berengario, Jacopo, Italian anatomist; b. Carpi, about 1470; d. Ferrara, 1530. He taught anatomy and surgery at Pavia, and finally settled at Bologna till a clamor caused by a rumor that he had got possession of two Spaniards affected by a loathsome disease, and was intending to dissect them alive, obliged him to retire to Ferrara. This rumor, caused doubtless by the fact that Berengario looked upon the dissection of the human body as the only means by which the science of anatomy could be advanced,

points out the source of the many important discoveries which he made, and the others for which he paved the way, leaving them to be followed out by Vesalius, Eustachius, and Fallopius. He is justly regarded as one of the principal founders of modern anatomy. He was also a dexterous operator, and published a practical work entitled, 'De Cranii Fractura.'

Berengarius of Tours, French theologian; b. Tours, about 1000; d. 6 Jan. 1088. He is renowned for his philosophical acuteness as one of the scholastic writers. While admitting the real presence of Christ in the Eucharist, he questioned the doctrine of transubstantiation and held that the substance of bread and of wine continued to exist with the body and blood of Christ (consubstantiation). He was condemned by several councils and several times recanted, but finally died fully reconciled with the Church. He is the first in theological history to call the doctrine of transubstantiation in question. He was treated with forbearance by Gregory VII., but the scholastics belonging to the party of Lanfranc, Archbishop of Canterbury, were irritated against him to such a degree that he retired to the Isle of St. Cosmas, in the neighborhood of Tours, in the year 1080, where he closed his life in pious exercises. On the history of this controversy, which has long occupied the attention of theologians, new light was shed by Lessing in his 'Berengar' (1770), and also by Stäudlin, who likewise published the work of Berengarius against Lanfranc. This Berengarius must not be confounded with Peter Berenger of Poitiers, who wrote a defense of his instructor Abelard.

Berenhorst, Francis Leopold von, German military writer; b. 1733; d. 1814. He was one of the first writers by whom the military art has been founded on clear and certain principles. He was a natural son of Prince Leopold of Dessau, and in 1760 became the adjutant of Frederick II. After the Seven Years' war he lived at Dessau.

Berenice, bē-rē-nī'se (a bringer of victory). (1) This was the name of the wife of Mithridates the Great, king of Pontus. Her husband, when vanquished by Lucullus, caused her to be put to death (about the year 71 B.C.), lest she should fall into the hands of his enemies. (2) The wife of Herod, brother to the great Agrippa, her father, at whose request Herod was made king of Chalcis by the Emperor Claudius, but soon died. In spite of her dissolute life, she insinuated herself into the favor of the Emperor Vespasian and his son Titus. The latter was at one time on the point of marrying her. (3) The wife of Ptolemy Euergetes; who loved her husband with rare tenderness, and when he went to war in Syria made a vow to devote her beautiful hair to the gods if he returned safe. Upon his return Berenice performed her vow in the temple of Venus. Soon after the hair was missed, and the astronomer Conon of Samos declared that the gods had transferred it to the skies as a constellation. From this circumstance the constellation near the tail of the Lion is called *Coma Berenices* (the hair of Berenice).

Berenice, a city of Egypt, on the Red Sea, whence a road, 258 miles in length, extended across the desert to Coptos, on the Nile. This

road was constructed in the reign of the second Ptolemy. Berenice was one of the principal centres by which the trade of Egypt, under the Macedonian dynasty, and that of the Romans subsequently, were carried on with the remote East. During the Roman period, a sum equal to \$2,000,000 is said to have been annually remitted to the East by the Roman merchants as payment for its precious products, which sold at Rome for a hundred-fold more than their original price. Nothing now remains of Berenice but a heap of ruins, adjoining the modern port of Habest. BERENICE, or Hesperis, a city of Cyrenaica, near which the ancients imagined the gardens of the Hesperides to be situated. The village, named Bengazi (q.v.), now occupies a portion of its site.

Berenson, Bernhard, Russian-American art critic: b. Wilna, Russia, 26 June 1865. He was educated in the schools of Boston and at Harvard University and has lived for many years in Florence, Italy. He has contributed much in the way of art criticism to the *New York Nation* and to French and German art reviews, and has published 'Venetian Painters of the Renaissance' (1894); 'Lorenzo Lotto: An Essay in Constructive Art Criticism' (1895); 'Florentine Painters of the Renaissance' (1896); 'Central Italian Painters of the Renaissance' (1897); 'The Study and Criticism of Italian Art' (1901).

Beresford, bër'ès-fèrd, Lord Charles William de la Poer, English naval officer: b. Ireland, 10 Feb. 1846. He became a rear-admiral in 1897. In 1882 he commanded the Condor in the bombardment of Alexandria, and was especially mentioned and honored for his gallantry. After the bombardment he instituted an efficient police system in the city. In 1884-5 he served on Lord Wolseley's staff in the Nile Expedition; and subsequently commanded the naval brigade in the battles of Abu Klea, Abu Kru, and Metemmeh. He commanded the expedition which rescued Sir Charles Wilson's party in 'Safia,' and was commended for his gallantry in both Houses of Parliament. He received the thanks of the French government for assisting the grounded *Seignalay*. In 1893-6 he was in command of the naval reserve at Chatham; was Commander-in-chief of the Mediterranean fleet, 1905-07; and Commander-in-chief of the Channel fleet, 1907-09. Lord Beresford accompanied the Prince of Wales on his visit to India in 1875-6, as naval aide-de-camp, and held the same relation to the queen in 1896-7. He has sat at various times in Parliament, as member for Waterford, East. Marylebone, York, and Woolwich. Besides numerous honors for gallantry as an officer he has received three medals for saving life at sea under trying circumstances. In 1898 he visited China at the request of the Associated Chambers of Commerce of Great Britain to make a study of the complicated commercial conditions existing there; and on his return, in 1899, he passed through the United States, and was received with distinguished honors by official and commercial bodies. He has done much to promote the 'open door' policy as a condition of international commerce in China. His publications include 'Life of Nelson and His Times'; 'The Break-Up of China' (1899), and many essays and special articles.

Beresford, William Carr, Viscount, English general, was a natural son of the first Marquis of Waterford: b. 2 Oct. 1768; d. Bedgebury Park, Kent, 8 Jan. 1854. He entered the army, and served at Toulon, and in Corsica; in the West Indies under Abercromby; and in Egypt under Baird. In 1806 he was raised to the rank of brigadier-general, and the same year commanded the land force in the expedition to Buenos Ayres. Having been ordered to Portugal in 1808, he was intrusted there with the remodeling of the Portuguese army—an office which he accomplished with great success; and in acknowledgment of his services was created a Marshal of Portugal, Duke of Elvas, and Marquis of Santo Campo. He subsequently took part in the siege of Badajoz, and the battles of Salamanca, Vittoria, and Bayonne. For his bravery at the battle of Toulouse he was raised to the peerage, with the title of Baron Beresford, afterward superseded by that of Viscount Beresford, conferred on him in 1823. In political principles he was a high Conservative; and a thorough supporter of the Duke of Wellington. In 1828, when the Duke became premier, he was made master-general of the ordnance, a post he held till 1830.

Berezin, byër-yë-zën', Ilya Nikolayevitch, Russian Orientalist: b. 1818; d. 1896. He studied Oriental philology at the University of Kazan, where in 1846 he was appointed professor, and in 1855 became professor of Turkish at the University of St. Petersburg. Some of his important works in Russian are 'Library of Oriental Authors' (1849-51); 'Tour Through Daghestan and Trans-Caucasia' (1850); 'A Grammar of the Persian Language' (1853); 'The Mongol Invasion of Russia' (1852-4); 'Popular Turkish Sayings' (1857). He wrote in French 'Recherches sur les dialectes musulmans' (1848-53), and edited the 'Russian Encyclopedic Dictionary' in 16 volumes.

Berezina, byër-yë-zë-na', a river in the Russian province of Minsk, rendered famous by the passage of the French army under Napoleon, 26-27 Nov. 1812. Admiral Tchitchakoff, with the Moldavian army, forced his way from the south to join the main army, which, after Borizoff had been retaken, was to assist the army led by Wittgenstein from the Dwina, and in this manner cut off Napoleon from the Vistula. Napoleon was therefore obliged to make the greatest efforts to reach Minsk, or at least the Berezina, and to pass it earlier than the Russians. After the advanced guard of the Moldavian army had been repelled to Borizoff by Oudinot, and the bridge there burned by them, early in the morning of 26 November, two bridges were built near Sembin, about two miles above Borizoff, an undertaking the more difficult, because both banks of the river were bordered by extensive morasses; covered, like the river itself, with ice not sufficiently strong to afford passage to the army, while other passes were already threatened by the Russians. Scarcely had a few corps effected their passage, when the greater part of the army, unarmed and in confusion, rushed in crowds upon the bridges. Those who could not hope to escape over the bridges sought their safety on the floating ice of the Berezina, where most of them perished, while many others were crowded into the river by their comrades. Besides the multitudes who were obliged to remain beyond the Berezina, the division of Par-

tonneaux, which formed the rear-guard, was also lost. It was intrusted with the charge of burning the bridges in its rear, but it fell into the hands of the enemy. According to the French bulletins only a detachment of 2,000 men, who missed their way, was taken; according to the Russian accounts the whole corps, 7,500 men and five generals. The river is a tributary of the Dnieper and has a course of some 335 miles. A canal system connects it with the Dwina.

Berezov, byër-yä-zöf' (the town of birch-trees), a town in Siberia, in the government of, and 400 miles north from, Tobolsk, on a height above the left bank of the Sosva, one of the branches of the Obi. It consists of wooden houses carefully built of large timbers, and generally with high steps in front, and contains three churches and a chapel. Its inhabitants, who are chiefly Cossacks, subsist by the chase and by fishing; they barter furs, skins, fish, etc., for flour, flesh-meat, tobacco, iron-ware, and brandy, brought by the Tobolsk dealers, whose craft are floated down the Irtysh into the Obi. Prince Menzikoff, the favorite of Peter the Great, died here in exile in 1731, having been banished by his grandson Peter II.

Berezovsk, byër-yä-zövs'k', a village in the Russian province of Perm, near Ekaterinburg, which gives name to a famous gold field, wrought since 1744. The mines are on the eastern slopes of the middle Ural chain, and the field is more than five miles long. The washings on the Berezovka River are also very productive.

Berg, bërg, Friedrich Wilhelm Rembert, Russian general: b. 1790; d. 1874. He is chiefly notorious for the severity with which he treated the unfortunate population of Poland during the insurrection of 1863, and which excited the horror and indignation of the civilized world.

Berg, bërg, Joseph Frederick, American clergyman: b. Antigua, W. I., 3 June 1812; d. New Brunswick, N. J., 1871. He came to the United States in 1825, entered the German Reformed ministry, in which he served, 1835-52, and then entered the Dutch Reformed Church and was professor of theology in the Dutch Reformed Theological Seminary at New Brunswick from 1861 till his death. He was distinguished for the intensity of his opposition to the Roman Catholic Church, on which theme he wrote extensively, his best known work being 'Synopsis of the Moral Theology of Peter Dens, as Prepared for Romish Seminaries and Students of Theology' (1842).

Berg, an ancient duchy of Germany, now included in the governments Arnsberg, Cologne, and Düsseldorf. It extended along the Rhine from the Ruhr to the frontiers of Nassau, and is everywhere hilly. It is more a manufacturing than an agricultural district, and has long been famed for its minerals, which include iron of the finest quality, lead, copper, zinc, and the precious metals. In addition to the employment furnished by these minerals, the inhabitants, who are very industrious, have with considerable success superadded textile manufactures. It is now indeed the chief manufacturing district in Germany, and the most densely peopled. It contains the important towns of Elberfeld and Barmen. The duchy of Berg, founded in 1389, had been long consolidated with the

Prussian dominions when (1806) Napoleon revived the title, and conferred it, with an enlarged territory, on Murat. On Murat's receiving the kingdom of Naples, Napoleon named his nephew Louis Napoleon (brother of the late Emperor Napoleon III.) hereditary Grand-duke of Berg, and increased its limits still farther. At the Congress of Vienna, in 1815, the whole was given to the king of Prussia.

Berga, a town of Spain, in the province of Barcelona, in a hilly district near the river Lobregat. There is an old castle overlooking the town, which carries on some manufactures of cottons.

Bergama, bërg'-mä, a town of Asia Minor, about 20 miles inland from the west coast, on the Selinus, a tributary of the Caicus, 46 miles north by east of Smyrna. It occupies the site of the ancient Pergamus (q.v.), and contains numerous remains attesting its ancient magnificence. In the centre are the remains of a large Roman basilica, a Byzantine church now converted into a mosque, and a curious double tunnel 200 yards long through which the river runs. To the east of the town is a steep hill with the acropolis and the remains of a Roman palace on the top. To the west of the town are the ruins of the ancient amphitheatre with arches of fine workmanship. It was built so that the arena could be flooded with water from a stream, thus affording an opportunity for nautical sports. Bergama is a flourishing town noted for its manufactures of morocco leather. Pop. about 6,000.

Bergami, Bartolommeo. The celebrated trial of Queen Caroline, wife of George IV. of England, was principally founded upon a charge of adulterous intercourse with Bergami, who, in 1814, upon recommendation of the Marquis Ghislieri, in whose previous employment he had been, was attached to her household. Bergami, who had fought his way up in the Italian army from a common soldier to the rank of quartermaster, belonged to a respectable family, and the Marquis Ghislieri described him to the queen as a person of character and attainments superior to his condition, and bespoke for him a kind treatment. This, and the personal advantages of Bergami, who was singularly good-looking, combining athletic strength and stature with almost feminine beauty, naturally disposed the queen in his favor. Moreover, he was full of loyalty and devotion, and on one occasion nearly became the victim of poison intended for her. The queen treated his whole family, especially a little child of his, with the greatest generosity and kindness. All these circumstances were used by her enemies as so many indications of her criminality, and during the trial one of the Italian witnesses, Teodore Majocchi, excited special indignation by his admitting every fact unfavorable to the queen, and by answering every question which might tell in her favor with *Non mi ricordo*. Bergami, who was at Pesaro during the trial, exclaimed, when he was apprised of her acquittal, but at the same time of her death, that she had been poisoned, and never could be convinced to the contrary. To the last he ever spoke of the queen with the greatest reverence and affection, and his deportment before and after her death led to the

conclusion that he looked upon her rather as a benefactress than as a mistress. However, wherever he went he became the observed of all observers. During his occasional excursions to Paris his apartments were crowded with visitors, consisting principally of ladies, who, under the pretext of having been friends of Queen Caroline, gratified their curiosity and obtained an interview with the portly courier. When at home he lived in great splendor; in the capitals of Italy, Rome, Naples, Milan, he was a lion, and the houses of "the best families" were open to him. At the time of the trial many different statements about Bergami's character were circulated in the House of Lords, but however contradictory in many other respects, they all agreed in this one fact, that he was as inoffensive as he was good-looking a person, who probably would never have been heard of beyond the precincts of Italian barracks if it had not been for his relation with Queen Caroline, and for the peculiar construction which was put upon it by her enemies at the trial. His name in England was, by a curious mistake, spelled with a P.

Bergamo, bĕr'ga-mō, Italy, city and capital of the province of Bergamo, situated in the district lying between the rivers Brembo and Serio. It consists of two distinct portions, the Città Alta (High Town), situated on hills, and now attainable by a cable tramway, and the much more extensive new quarters in the plain. Bergamo trades largely in silk, silk goods, grain, etc. At its fair goods to the value of a million sterling have sometimes been sold. It has an academy of painting and sculpture, a museum, an athenaeum, a public library, several secondary schools, and various manufactories, especially of silk. There is a cathedral, but some of the other churches are of greater interest. There is a small Protestant congregation. The comic characters in the Italian masked comedy are Bergamese, or affect the dialect of the country people in the neighborhood of this city. In 1796 Bonaparte took Bergamo, and it was subsequently made the capital of the department of the Serio, in the kingdom of Italy. Among many distinguished men born here are Tiraboschi, the historian of Italian literature; the composer Donizetti, and Cardinal Mai. Pop. about 46,000.

Ber'gamot, a shrub or small tree of the genus *Citrus* (natural order *Butaceæ*) variously placed as a variety of the orange (*C. aurantium*) and of the citron (*C. medica*). The plant is largely cultivated in southern Europe, especially Italy, for its green, bitter volatile oil, known as oil or essence of bergamot which is expressed or distilled from its highly aromatic rind for use in perfumery. The name is also applied, mainly in Europe, to many varieties of pears and in both Europe and America to several species of the natural order *Labiata*; for example, *Mentha aquatica* (Europe), *Monarda didyma* and *M. fistulosa* (America). The name seems to be a corruption of the Turkish *beg armadı*, a lord's pear. See *CITRUS*.

Bergedorf, bĕrg'ĕ-dōrf, a town of Germany, 10 miles southeast of Hamburg, and in the territory belonging to that city, on the Bille, a tributary of the Elbe. It has flourishing glass works and manufactures of enamel ware. It was held jointly by Lubeck and Hamburg till

1867, when Lubeck assigned its rights to Hamburg on payment of 200,000 thalers. Pop. about 11,000.

Bergen, Joseph Young, American educator: b. Red Beach, Me., 22 Feb. 1851. He graduated at Antioch College, Ohio, 1872, and for a time was on the Ohio Geological Survey and professor of natural sciences at Lombard University, becoming later a teacher of science in the Boston high and Latin schools. He is joint author of 'The Development Theory: the Study of Evolution Simplified for General Readers' (1884); Hall and Bergen's 'Physics'; 'Elements of Botany'; and 'Foundations of Botany.'

Bergen, Norway, a seaport on the west coast, capital of a province or diocese of the same name, formerly the principal town of the kingdom, but now the second. It is 186 miles northwest of Christiania, and about 25 from the open sea, and is situated on and about the head of two inlets, one of which forms the harbor. The tongue of land between the harbor and the other inlet (Puddefjord) is an elevated ridge crowned by an old fort, while the entrance on the other or northeast side is commanded by the old fortress of Bergenhus, now partly used as a prison. Rocky hills from 800 to 2,000 feet high encircle the town on the land side and furnish many picturesque spots. The climate is comparatively mild, on account of the sheltered situation, but is remarkable for rain, the annual rainfall being about 73 inches. The town is well built and clean, but the houses are mostly of wood, and many of the streets are crooked and uneven, on account of the irregularity of the site. There are a number of squares or open spaces, including the market-place. There is a cathedral (built in 1537), and several other churches, the oldest being St. Mary's, built after a fire in 1249. The public institutions include schools, a library of 60,000 volumes, a theatre, a museum, and other useful institutions. The inhabitants of the middle coast of Norway bring timber, tar, train-oil, hides, etc., and particularly dried fish (stock-fish), to Bergen to exchange them for grain, flour, and other necessities. The town carries on a large trade in these commodities, and its exports of dried fish, herrings, tar, etc., are especially large. A considerable amount of ship-building is carried on. A United States consul is resident here. Bergen was founded by King Olaf Kyrre in 1070. The Hanseatic league established a factory here about 1340 and long monopolized the trade. Bergen is the native place of the poet Holberg.

Bergen-Op-Zoom, berg'en-ōp-zōm', a town of Holland, in a marshy situation on the Scheldt, where the Zoom enters it, 20 miles north-northwest of Antwerp. It was formerly a strong fortress, the morasses around it making it almost inaccessible to an assailing force, while its fortifications consisted of regular works, constructed by the celebrated Coehorn. It is well built, but has no edifices deserving of particular notice. It made an important figure during the Spanish war, and successfully resisted the attacks of the Duke of Parma in 1581 and 1588, and of Spinola in 1622. It was taken by the French in 1747 after a siege of nearly three months; and in 1795 the French under Pichegru again gained possession of it by capitula-

BERGENGREN — BERGK

tion. It was unsuccessfully attempted by the British under Sir Thomas Graham, afterward Lord Lynedoch, in 1814. Its trade has suffered greatly from the proximity of Antwerp. Pop. about 16,000.

Bergengren, Anna (FARQUHAR), MARGARET ALLSTON, American novelist: b. Brookville, Ind., 23 Dec. 1865. She is the wife of R. Bergengren, (q.v.), and has published 'The Professor's Daughter' (1899); 'Her Boston Experiences' (1900); 'The Devil's Plough' (1901); 'Her Washington Experiences' (1901).

Bergengren, Ralph Wilhelm Alexis, American journalist and cartoonist: b. Gloucester, Mass., 2 March 1871. He has published a collection of verses and cartoons entitled 'In Case of Need' (1899).

Bergerac, bâr-zhrâk, Cyrano de, a famous five-act tragedy by Edmond Rostand, founded on the life of Savinien Cyrano de Bergerac. It was first played in Paris, 28 Dec. 1897, with Coquelin in the title rôle and in New York 3 Oct. 1898 with Mansfield in the same rôle. See ROSTAND, EDMOND.

Bergerac, Savinien Cyrano de, French author: b. 1619; d. 1655. He was distinguished for his courage in the field, and for the number of his duels, more than a thousand, most of them fought on account of his monstrously large nose. His writings, which are often crude, but full of invention, vigor, and wit, include a tragedy, 'Agrippina,' and a comedy, 'The Pedant Tricked,' from which Corneille and Molière have freely borrowed ideas; and his 'Comical History of the States and Empires of the Sun and the Moon' probably suggested 'Micromégas' to Voltaire, and 'Gulliver' to Swift. His works have been frequently republished. He was made the hero of a drama bearing his name, written by Edmond Rostand, the French playwright, which had a phenomenal success in the United States in 1899-1900, and was the occasion of a suit for plagiarism. See ROSTAND, EDMOND.

Bergerac, a town of France, in the department of the Dordogne, and on the river Dordogne. Among its industries are paper-mills, ironworks, distilleries, etc. The town, 48 miles east of Bordeaux, gives the name to an agreeable wine cultivated on the banks of the Dordogne, in France sometimes called *petit champagne*.

Bergerat, bârzh-ra, Auguste Emile, French journalist, playwright, and novelist: b. Paris, 29 April 1845. He is son-in-law of Théophile Gautier, and since 1884 particularly known as the amusing chronicler of the 'Figaro' under the pseudonym of CALIBAN. His *feuilletons* for that paper were published collectively as 'Life and Adventures of Sieur Caliban' (1886); 'The Book of Caliban' (1887); 'Caliban's Laughter' (1890), etc. He also wrote two novels, 'Faublas in Spite of Himself' (1884); 'The Rape' (1886); besides two volumes to the memory of his father-in-law, 'Théophile Gautier, Painter' (1877), and 'Th. Gautier, Conversations, Souvenirs, and Correspondence' (1879).

Bergh, bérgh, Henry, American philanthropist and author: b. New York, 1823; d. there, 12 March 1888. He was educated at Columbia College, and from 1861 to 1864 was in the diplomatic service, being secretary of the American

legation and United States consul at St. Petersburg. In 1865 he founded the American Society for the Prevention of Cruelty to Animals, was chosen its president, and in 1866 secured the passage of an act giving the society the power of making arrests and carrying on prosecutions for violations of the statute on which the organization was instituted. He remained president of the society until his death, being ever its guiding spirit, living entirely in its work, and serving without compensation. At the beginning of his work no State or Territory had any statute relating to the prevention of cruelty to animals. At the time of his death 39 States had proper laws on the subject, and in 36 of them branch societies of the organization had been formed. He was the author of a volume of tales and sketches 'The Streets of New York'; a successful drama, 'Love's Alternative,' produced in Baltimore, 1881; 'The Portentous Telegram'; 'The Ocean Paragon'; and 'Married Off; a Poem' (1859).

Bergh, Johann Edvard, Swedish landscape artist: b. Stockholm, 1828; d. 1880. He was a professor in the Stockholm Academy and is looked upon as the founder of a new school of landscape art in Sweden, distinguished by accurate drawing, intelligent representation of nature, and a very decided nationalism. Among his most noted subjects are 'Wood Interior'; 'View of Stockholm'; 'View in Dalecarlia.'

Bergh, Pieter Theodoor Helvetius van den, Dutch dramatist and poet: b. Zwolle, 1793; d. 1873. He attracted attention with his comedy 'The Nephew' (1837), considered one of the best in modern Dutch literature, but did not justify expectations by his subsequent dramatic efforts. He also published 'De Nichten,' and a collection, 'Prose and Poetry' (3d ed. 1863).

Berghaan, bérgh'hân, a Dutch and colonial name in South Africa for several large hill-haunting eagles, especially the *bataleur* (q.v.).

Berghaus, bérgh'how's, Heinrich, German geographer: b. Cleve, 3 May 1797; d. Stettin, 17 Feb. 1884. He served in 1815 in the German army in France, and was from 1816 to 1821 employed in trigonometrical survey of Prussia under the war department. From 1824 to 1855 he was professor of applied mathematics in the Berlin Academy of Architecture. Besides his various maps and his great 'Physical Atlas' (republished in a remodeled form in 1886-92), he published 'Allgemeine Länder-und Völkerkunde' (1837-41); 'Die Völker des Erdballs' (1852); 'Grundlinien der physikalischen Erdbeschreibung' (1856); 'Grundlinien der Ethnographie' (1856); 'Deutschland seit hundert Jahren' (1859-62); 'Was man von der Erde Weiss' (1856-60); 'Sprachschatz der Sassen, or Low German Dictionary' (incomplete); etc.

Berghem, Nikolaas. See BERCHEM, NIKO-LAAS.

Bergk, Theodor, German classical philologist: b. Leipsic, 22 May 1812; d. Ragaz, Switzerland, 20 July 1881. He became an indisputable authority on Hellenic poetry, producing two works of surpassing importance in that department of scholarship: 'Greek Lyric Poets' (4th ed. 1878-82), and 'History of Greek Literature' (1872); the latter not quite completed at his death, but brought to perfection with the aid of his posthumous papers. He contributed

BERGMANN — BERIBERI

much of value, likewise, to our knowledge of special departments of classical learning.

Bergmann, Ernst von, German surgeon: b. Riga, 16 Dec. 1836; d. Wiesbaden, 25 March 1907. He served in the Prussian army 1866-70; was professor of surgery in the Univ. of Würzburg 1878-82; and became director of the surgical clinic at the Univ. of Berlin in 1882. He wrote 'The Putrid Poison'; 'The Embolism of Fatty Tissues'; 'The Poison'; 'Instruction Concerning the Putrid Intoxication,' etc.

Bergmann, Julius, German philosopher: b. Opherdike, Westphalia, 1840. He was professor of philosophy at Marburg from 1875. Among his more important writings are 'Grundlinien einer Theorie des Bewusstseins' (1870); 'Zur Beurteilung des Kriticismus' (1875); 'Reine Logik' (1879); 'Sein und Erkennen' (1880); 'Der Grundprobleme der Logik' (1882); 'Geschichte der Philosophie' (1892-4); 'Untersuchungen über Hauptpunkte der Philosophie' (1900).

Bergmann, Karl, American musician: b. Ebersbach, Saxony, 1821; d. New York, 10 Aug. 1876. Participation in the revolutionary outbreaks of 1848 obliged him to go into exile and he came to New York. He organized and conducted the first great German music festival, held in the Winter Garden Theatre (1855); in 1856 introduced German opera at Niblo's Garden, and for several years prior to his death conducted the concerts of the Philharmonic Society. He composed several orchestral pieces, and excelled as a player of the violoncello and the piano.

Bergmann, Torbern Olof, Swedish natural philosopher and chemist: b. Katharineberg, West Gothland, 20 March 1733; d. 1784. In 1758 he became doctor of philosophy and professor of physics at Upsal. Upon the resignation of the celebrated Wallerius, Bergmann was a candidate for the professorship of chemistry and mineralogy. His competitors charged him with ignorance of the subject, because he had never written on it. To refute them he shut himself up for some time in a laboratory, and prepared a treatise on the manufacture of alum, which is still considered as a standard work. In 1767 he became professor of chemistry, and devoted himself with ardor to this science. He invented the preparation of artificial mineral waters, and discovered the sulphuretted hydrogen gas of mineral springs. We are indebted to him for a knowledge of the characters which distinguish nickel from other metals. On a number of minerals he made chemical experiments, with an accuracy before uncommon. He published a classification of minerals, in which the chief divisions are based on their chemical character, and the subdivisions on their external form. In preparing this work he was much aided by his former discovery of the geometrical relations between different crystals of the same substance, which may be deduced from one primitive form, and are produced by the aggregation of similar particles, according to fixed and obvious laws. His theory of the chemical relations is still esteemed, and although it has received new developments from the further researches of Berthollet, has not been overthrown. The order of Gustavus Vasa was bestowed on Bergmann. Among his works the first place is due to 'Opuscula Physica, Chemica, et Mineralia' (1779-94), of which

an English translation appeared. His famous essay on 'Elective Affinities' was translated into English by Dr. Beddoes.

Bergmehl, bērg'māl, a whitish earth, consisting almost entirely of the flinty shields of microscopic plant growths. It occurs in bog and ancient lake deposits in many parts of northern Europe, and, during times of great scarcity, it has been, when mixed with flour, eaten as food. Some writers assert that hundreds of carloads are consumed every year by the inhabitants of northern Sweden. From analysis, it does not appear to contain any positive nutriment.

Bergsøe, bērg'sø, Jorgen Vilhelm, Danish novelist, poet, and naturalist: b. Copenhagen, 8 Feb. 1835. While suffering partial blindness, caused by excessive use of the microscope in his memorable biological researches at Messina, he turned to literary composition; and soon appeared the first of a cycle of novels, 'From the Piazza del Popolo' (1866), which had an extraordinary success. The following year he published his first volume of poems, 'Now and Then.' Of his many novels, the one which excels for fineness of touch is, 'Who was He?' All his stories are characterized by rich imagination, fine observation, and great originality; his poetry is inferior in these respects to his prose.

Bergues, bârg, France, a town in the department of Le Nord, in a marshy district, five miles south of Dunkirk; population (1891), 5,380. It ranks as a fortress of the second class, is well built of brick, and having a basin which admits vessels of 250 tons, is the centre of a considerable trade. Its principal edifices are the townhouse, and a beautiful and richly ornamented belfry about 160 feet high. It owes its origin to the castle of Berg, to which St. Winnoc retired in 902, was first fortified by Baldwin II., Count of Flanders, afterward adorned with a magnificent monastery of St. Winnoc by Baldwin IV., and in the 13th century possessed flourishing manufactures. It suffered dreadfully during the wars in the Low Countries. Pop. about 4,700.

Ber'gut, or **Bearcoot**, the Tartar name in Central Asia for the golden eagle (see **EAGLE**), there trained by Kirghiz for use in falconry.

Berhampur, bē-rhām-poor', the name of two towns of India. (1) The capital of the Ganjam district, Madras, 525 miles northeast of Madras, with which it is connected by rail. A good road leads from it to the coast town of Gopalpur, nine miles distant. As the headquarters town of the district, it contains the usual official buildings. Silk cloth is manufactured, and there is a considerable trade in sugar. The climate is unhealthy. Population, with cantonment, 25,653. (2) A town of the Moorshedabad district, Bengal, on the left bank of the Bhagirathi, 5 miles south of Moorshedabad. The first open act of the Sepoy mutiny took place here on 25 Feb. 1857. The town contains a government college. Pop. about 25,000.

Beriberi, bā-rī-bā'ri, an epidemic form of multiple neuritis formerly very prevalent in China, but now common in Japan, the Philippines, and associated tropical countries. It is said to be not infrequent among sailors in and about the ports on the Gulf of Mexico, particu-

BERING—BERING SEA CONTROVERSY

larly New Orleans (Bondurant). It is supposed to be of bacterial origin, although an exclusive rice diet is claimed to be at least a predisposing cause. The disease exhibits three main types, an acute pernicious, the atrophic or dry, and the dropsical or wet forms. The symptoms are those of a multiple neuritis (q.v.), and the treatment is that for this disease.

Bering, be'ring, or Behring, Vitus, Danish navigator: b. Horsens, 1680; d. 19 Dec. 1741. Being known as a skilful seaman, he was employed by Peter the Great in the navy established at Cronstadt. His talents and the undaunted courage displayed by him in the naval wars against the Swedes, procured him the honor of being chosen to command a voyage of discovery in the sea of Kamchatka. He set out from St. Petersburg, 5 Feb. 1725, for Siberia. In the year 1728 he examined the northeastern coasts of Asia, discovered the strait named after him, and proved that Asia is not united to America. It remained, however, to be determined whether the land opposite to Kamchatka was in reality the coast of the American continent, or merely islands lying between Asia and America. On 4 June 1741 he sailed, with two ships, from Okhotsk, and touched the northwest coast of America. Tempests and sickness prevented him from pursuing his discoveries; he was cast on a desolate island covered with snow and ice, where he died. See *Life* by Lauridsen (Chicago 1890).

Bering Sea, that part of the north Pacific Ocean between the Aleutian Islands, in 55°, and Bering Strait, in 66° N., by which latter it communicates with the Arctic Ocean. It has on its west side Kamchatka and the Chukchi country, with the Gulf of Anadyr, and on its east the territory of Alaska, with Norton Sound and Bristol Bay; contains several islands, and receives the Yukon River from North America and the Anadyr River from Asia. Fogs are almost perpetual in this sea. Ice is formed and melted in the sea every year, the northern part becoming closed to navigation about the beginning of November. Pack ice gradually extends southward to a little below the latitude of St. Matthews Island (60½°), beyond which ice is found in flocs. The southern limit of the ice usually extends from Bristol Bay, Alaska, to about 35 miles south of Pribilof Island, though in exceptionally severe winters it reaches as far south as Unimak Pass. It usually leaves Pribilof Island about 1 May, and vessels following in its wake may reach Bering Strait between about 15 and 25 June. A strong and comparatively warm current sets northward at about two to three knots an hour, through Bering Strait, and after following the Siberian shore turns north toward Herald Island. A cold current also passes out through the strait.

Bering Sea Controversy, an international dispute over the territorial status of that sea, chiefly between the United States and Great Britain, and growing out of attempts of the former to protect its fur-sealing industries there from the Canadian subjects of the latter. This industry rests on three great herds in the North Pacific, which resort regularly to certain islands in the breeding season, from May or June till the autumn storms, then move southward to about 35° N., and gradually work northward the next spring. At the islands the elder

males remain with the young on the beach while the females go in search of food, sometimes 200 miles. The younger males, or "bachelors," two to four years old, herd apart, and should furnish all the commercial sealskins, the pelts of the old males being unsalable and the killing of females a blow at the continuance of the species. But this selection can only be made on shore; pelagic or ocean sealing is at best indiscriminate if done during migrations, and is almost exclusively of females during the breeding season, while every mother seal then killed means a young seal starved ashore. The largest of these "rookeries" is on the Pribiloff Islands in Bering Sea, where the Russian-American Company carried on sealing till their cession to the United States in 1867, when it was taking some 40,000 seals a year; the herd being protected by restrictive regulations. In 1821 Alexander I. issued a ukase claiming Bering Sea as Russian property, and forbidding trespass on pain of confiscation; but the United States and Great Britain protested so vigorously that the claim was dropped. After the cession, the rivalry of competing companies would speedily have made an end of the seals in the Northern Ocean, as it long since had in the Southern, had not the United States leased the islands for 20 years to the Alaska Commercial Company (which then leased the Russian seal-islands also) for \$55,000 a year and \$2.62½ a skin, restricting the catch to 100,000 a year. In fact the company kept a little under that mark; but the contract was so profitable that vessels were soon fitting out from British Columbia, Hawaii, and Australia, which intercepted the seals as they passed between the Aleutian Islands northward or southward, or entered Bering Sea and caught the females as they ranged the seas for food. The poaching grew in volume, and a stream of protest from the Alaska Company flowed in year after year to the government at Washington, which in 1881 was goaded into officially reversing its former contention, and declared Bering Sea east of the treaty meridian of 1867 American waters; but took no further step till 1886, when under President Cleveland it seized and condemned three Canadian sealers. Great Britain protested, and proceedings were suspended pending discussion; but in 1887 five more were seized, and the question at once became a burning one in our diplomacy. Secretary Bayard attempted to convene delegates from Great Britain, France, Germany, Sweden, Russia, and Japan, to meet with our own and frame regulations to prevent the extirpation of the northern seals; but in June 1888 Great Britain withdrew, under pressure from Canada. In 1889 several more Canadian vessels were seized, and Great Britain sent a practical menace of war if this were not stopped. There being but three alternatives, abandonment of the sealing interest to destruction, which the country would not endure; seizure of all poaching sealers, which meant war; and arbitration—the latter was decided on in 1890. The same year the Alaska Company, its lease expired, was succeeded by the North American Company; the herd, estimated in 1867 at over 3,000,000 on the Pribiloff Islands, had shrunk so enormously under the pelagic sealing that the price had risen from \$2.50 to \$30 per skin, and the new company's limit of capture was restricted to 20,000, with a royalty

BERING STRAIT — BERINGTON

of \$10 a skin. On 15 June 1891 a *modus vivendi* was agreed on for joint policing of Bering Sea by British and American vessels; and on 29 Feb. 1892 a treaty of arbitration was signed, under which on 23 March 1893 a tribunal met at Paris, composed of Baron de Courcel (France), Marquis Emilio Visconti-Venosti (Italy), Judge Gregers W. W. Gram (Sweden-Norway), Lord Hannan (England), Sir John S. D. Thompson (Canada), Justice John M. Harlan, and Senator John T. Morgan (United States). The United States case was conducted by the secretary of state (John W. Foster); counsel, Edward J. Phelps, James C. Carter, Frederick R. Coudert, and Henry Blodget. The decision on the legal points was entirely against the United States; Bering Sea was held part of the high seas and no one's preserve, and seals *feræ naturæ* and no one's property. But on the point of equity in our case, that the preservation of the seals from extinction was a common interest of the civilized world, it agreed with us, and framed regulations binding for five years to prohibit all pelagic sealing within 60 miles of the Pribiloffs, or from 1 May to 31 July in the North Pacific east of 180° or north of 35°, with other regulations. The restrictions proved absurdly ineffective, and Great Britain would not antagonize Canada to make them less so; in 1894 the pelagic catch was the enormous one of 142,000, far beyond any former record, and for several more seasons was very great, till the herds showed signs of rapid exhaustion. Great Britain obstinately refused to make any change in the regulations till the five years were up, sent an expert to the spot who laid all the blame on the North American Company, and refused to send a delegate to meet those of Russia, Japan, and the United States, who agreed to prohibit pelagic sealing to their subjects if Great Britain would do so. Meantime, to put pressure on the latter, Congress prohibited the importation of all sealskins except the North American Company's, in order to destroy the market for Canadian-caught skins and make their business unprofitable; but England still refused to agree to the provisional treaty, on the ground that it would injure Canada, was not necessary to protect the seals, and that the North American Company was solely in fault. But on 18 Nov. 1897 a joint meeting of English, American, and Canadian experts was held, and unanimously supported the American contention at every point; that the herds had diminished by from 66⅓ to 80 per cent, and markedly so even from 1896 to 1897; that the North American Company was handling its business with entire propriety; that pelagic sealing, involving the killing off of the females, was the sole cause of the reduction, which was threatening the entire extinction of the fur seal. Another year would bring about the time for changing the Paris regulations; and the United States agreed to prohibit all seal killing even on the Pribiloffs for a year, but Canada would not consent because it would scatter the crews of her sealing fleet. Meantime, Congress on 14 June 1898 appropriated \$473,151.26 to pay for the Canadian vessels seized years before. On 30 May 1898, a joint Canadian and American commission was authorized; it met at Quebec in August, adjourned to November at Washington, continued till February 1899, adjourned to the summer, and never reassembled. Most un-

fortunately, its scope included all the questions at issue between the two governments: the sealing problem became entangled at the outset with impossible bargains for general commercial reciprocity, then with the Alaska boundary question (q.v.) made acute by the Klondike gold discoveries, and at the adjournment not a single issue before it had been decided. The Paris regulations had expired, no new ones had been established, and the seals were left wholly without protection; while even so, as the United States forbade pelagic sealing to its citizens while England did not, all the profit of the perishing industry was being reaped by foreigners. The Canadian fleet of 1899 numbered 26 vessels, that of 1900 numbered 33, with a catch of over 35,000 each year, considerably more than half females. The same conditions have prevailed since; the North American Company has been increasing its efforts in order to obtain its share while the seals last; and in the Congressional session of 1901-2 it was seriously proposed to kill off the entire herd at once, and thus end the question by putting an end to the seals. (The latest work on this subject is the chapter in Henderson's 'American Diplomatic Questions,' 1901; earlier aspects were discussed in Stanton's 'Bering Sea Controversy' 1892.) See U. S.—DIPLOMACY OF THE

Bering Strait and Island. The strait is the channel that separates Asia from America, and connects the North Pacific with the Arctic Ocean. Its breadth at the narrowest part, between Cape Prince of Wales on the American coast and East Cape in Asia, is about 36 miles, and its depth in the middle varies from 29 to 30 fathoms. On both sides are several commodious bays; but the country is barren and rocky, with scanty vegetation. The sea here is frozen over every winter, and foggy, hazy weather is almost perpetual. Whales frequent the strait, and the walrus occurs in vast numbers. The inhabitants on either shore support themselves chiefly by hunting and fishing; but those on the Asiatic side are greatly superior, both physically and intellectually, to those on the American. The strait is called after Vitus Bering, by whom it was first discovered. It was more fully explored by Capt. Cook in 1778. **BERING ISLAND** is in the southwest part of the above sea, off the east coast of Kamchatka. It is uninhabited, and is without wood. It has, however, several springs of excellent water. Here the navigator Bering died in 1741.

Ber'ington, Joseph, English Roman Catholic theologian: b. Shropshire, 1744; d. Berkshire, 1 Dec. 1827. His first work was 'A Letter on Materialism, and Hartley's Theory of the Human Mind' (1776). About this time, the English Roman Catholics found their position much stronger in the arena of public opinion, and began to think of appearing there openly. Berington, in 1779, published a letter to Fordyce, on his 'Sermon against Popery.' In 1780 appeared his 'State and Behavior of English Catholics from the Reformation till 1780.' In 1786 he came forward with 'An Address to the Protestant Dissenters,' who had lately petitioned for a repeal of the corporation and test acts. In 1787 appeared the 'History of Abelard and Heloise,' with their genuine letters, and 'An Exposition of Roman Catholic Principles, in reference to God and the Country,' and other

BERIOT — BERKELEY

pamphlets. In 1790, Berington gave to the world a 'History of Henry II.' (of England), vindicating the character of Becket from Lord Lyttleton's attacks. In 1793 appeared his 'Memoirs of Gregorio Panzani,' papal legate to England in 1634-6, translated from the Italian. But his most important work appeared in 1814, a 'Literary History of the Middle Ages,' giving an account of the state of learning from the close of the reign of Augustus to its revival in the 15th century."

Beriot, bâ-re-ô, Charles Auguste de, Belgian violinist: b. Louvain 20 Feb. 1802; d. there 20 April 1870. He studied with Robbrecht and Tiby, and, in Paris, with Baillot; and became a professor in the Conservatory in Brussels in 1842. In 1836 he married the celebrated singer, Malibran. He published a 'Violin Method' (1858).

Berislav, bâ-rê-slâf, or Borislav, Russia, a fortified town on the Dnieper River. It is the centre of trade for the district. Pop. about 13,700.

Berkeley, George, English philosopher and bishop: b. Kilmrin, Ireland, 12 March 1685; d. Oxford, 14 Jan. 1753. He was educated at Trinity College, Dublin, where he took a keen interest in the philosophical problems then under discussion. He received the degree of A.B. with honors in 1704, being afterward successively scholar and fellow. Almost immediately he began his career of authorship. He published in 1709 his first important work, the 'New Theory of Vision,' which is the logical preliminary to his system and gives expression to certain of its fundamental principles. A year later his philosophy finds complete statement in the 'Treatise Concerning the Principles of Human Knowledge.' During the next 15 years Berkeley advanced to a position of prominence in the English Church. In 1711, shortly after his ordination to the diaconate, he published his 'Discourse on Passive Obedience,' a treatise upon ethics, in which he develops a system of theological utilitarianism. The 'Dialogues,' published in 1711, present his philosophy in literary form, clothing subtle argument in a garb of rhetorical beauty. In the years immediately following, several new works appeared, accompanied by increasing fame and prosperity. He was appointed successively to the deaneries of Dromore and of Derry, the latter of which yielded a large income. But this he resigned in order to devote himself to a plan for the establishment of a college in the Bermudas, where the Indians of America were to be enlightened and Christianized. For the furtherance of such a plan he obtained a promise from the government for a grant of £20,000. Upon the strength of this he sailed for America in 1728, accompanied by his wife and a few friends. They went first to Rhode Island, where they planned to await the expected grant. Here Berkeley purchased a farm and waited three years in quiet and study. Finally, upon the failure of the government to make good its promise, he was compelled to give up his cherished plan and return to England in 1731. Soon after his return he was made Bishop of Cloyne. During the remaining years of his life he published a number of works upon philosophy, economics, and other subjects. Notable among these were 'Alciphron, or the Minute Philoso-

pher,' the result of his quiet studies in Rhode Island, and 'Sirius,' a remarkable essay in which the author interweaves his convictions concerning the healing properties of tar-water with the deepest and most profound of his philosophic reflections.

Although the representative English idealist, Berkeley proceeds in his thought from the empirical philosophy of Locke. It was Locke's contention that in knowledge we are concerned with our own ideas only, and that these ideas are derived entirely from experience. He made an important distinction among these ideas, however, with reference to their representation of objective or material reality. Ideas of color, sound, taste, etc., called secondary qualities, are subjective processes, and reveal nothing of the nature of material reality. But ideas of extension, figure, motion, etc., called primary qualities, reveal directly the nature and constitution of that reality which exists without the mind in the material world. Berkeley agreed with Locke that we know only our own ideas, but he attacked vigorously this distinction between primary and secondary qualities. He maintained that ideas of primary qualities are wholly subjective, and tell us no more of the nature of material reality than do our ideas of secondary qualities. He attempts a partial proof of this in his 'New Theory of Vision,' by showing that distance, magnitude, and situation, are not directly perceived by sight, but are inferred in an indirect manner. These ideas of distance, magnitude, and situation are results of judgment based upon visual sensations. Such visual sensations have no essential relation to the ideas in question, however—they are simply associated with them in experience. For example, consider our idea of distance. We find connected with this idea: (1) Sensation of movement in the eye; (2) confusion in vision due to nearness of the object; and (3) strain of fixation. These sensations are associated by custom with degrees of distance. Hence we have in this idea of distance no direct revelation through vision of the nature of material reality. Rather we have the product of our own judgment, based upon sensations which have themselves no objective reference. So it is with other ideas of primary qualities which have been held to bring us into immediate contact with material reality. In ideas of figure and motion we have sensations of light, color, and strain, and the remainder is due to association and judgment. Thus Berkeley concludes that we have in visual ideas not a revelation of the nature of matter, but a universal language of symbols whereby we interpret our sensations of touch, and so regulate our actions as to preserve and promote our lives. In his 'Treatise Concerning the Principles of Human Knowledge,' he uses this conclusion to disprove the existence of a material world apart from, and independent of, the perceiving mind. The very notion of matter or corporeal substance involves insoluble contradiction. By matter is meant inert, senseless substance in which extension, figure, and motion reside. But these so-called attributes of matter are ideas in the mind, and are shown to be every whit as subjective as ideas of colors and tastes. Now, ideas can be similar only to ideas. Hence to suppose that our ideas copy or represent a material substance that is unperceiving and

BERKELEY

unperceived, is a crass absurdity. Ideas are the only objects of our thought. To exist as an object is to be perceived. (*Esse est percipi.*) Although confined to our own ideas, we may observe their various characteristics and combinations. Sense qualities are simple states of consciousness. Sense-objects are sensation-complexes. There is in our consciousness a continuous succession of these perceptions, in which we perceive perceptions newly excited, perceptions changed, and perceptions obliterated. For all this phenomena there must be some cause. This cause cannot be an idea or combination of ideas; for it is the appearance and arrangement of ideas which must be explained. This cause must be a substance, a ground of existence. Matter, or corporeal substance, is an impossibility. We are compelled, therefore, to find the cause of our ideas in an incorporeal, active substance, or spirit. But we observe an important difference in the production of our ideas. Those ideas actually perceived by the senses of the individual are not dependent upon his own mind or will. Hence there must be some other will or spirit which produces them. This is God, the Author of Nature. The ideas of sense are imprinted upon our minds by the direct influence of the Divine Mind. Hence they are strong, orderly, and coherent. Their source guarantees their trustworthiness, and with good reason they may be called "real things." In this way our knowledge acquires an objective validity much more adequate than if our ideas were aroused by the action of a material substance upon our sense-organs. The laws of nature, which we properly regard, represent the regular operation of the Divine Mind upon our minds. There is consequently no difficulty in distinguishing the order of ideas which is real and objective, from the train of subjective fancies and imaginations.

The best edition of Berkeley's works is that by Fraser (2d ed. 1902), containing a 'Life.' Consult further: Fraser's briefer 'Life' (1881; new ed. 1901; in 'Philosophical Classics'); Frederichs, 'Ueber Berkeleys Idealismus' (1870); Spicker, 'Kant, Hume und Berkeley' (1875); Janitsch, 'Kants Urtheil über Berkeley' (1879).

H. W. WRIGHT,
Cornell University.

Berkeley, George Charles Grantley Fitzhardinge, English writer: b. 10 Feb. 1800; d. Poole, Dorsetshire, 23 Feb. 1881. In 1832-52 he was a member of the British Parliament, and for a time he was in the army. His 'My Life and Recollections' (1864-6), an extensive work, attracted some attention. Among his further works are: 'Berkeley Castle' (1836); 'Sandron Hall, or the Days of Queen Anne' (1840); 'The English Sportsman on the Western Prairies' (1861); 'Anecdotes of the Upper Ten Thousand at Home and Abroad' (1867); and 'Tales of Life and Death' (1870).

Berkeley, Sir George, English engineer: b. London 26 April 1821; d. there 20 Dec. 1893. In 1835 he began experimenting with methods for operating atmospheric railways. In 1841 he associated himself with Robert Stephenson and continued his experiments. On Stephenson's death he became engineer of the Great Indian Peninsular Railway. In 1892 he was made president of the Institute of Civil Engineers. He wrote papers on atmospheric rail-

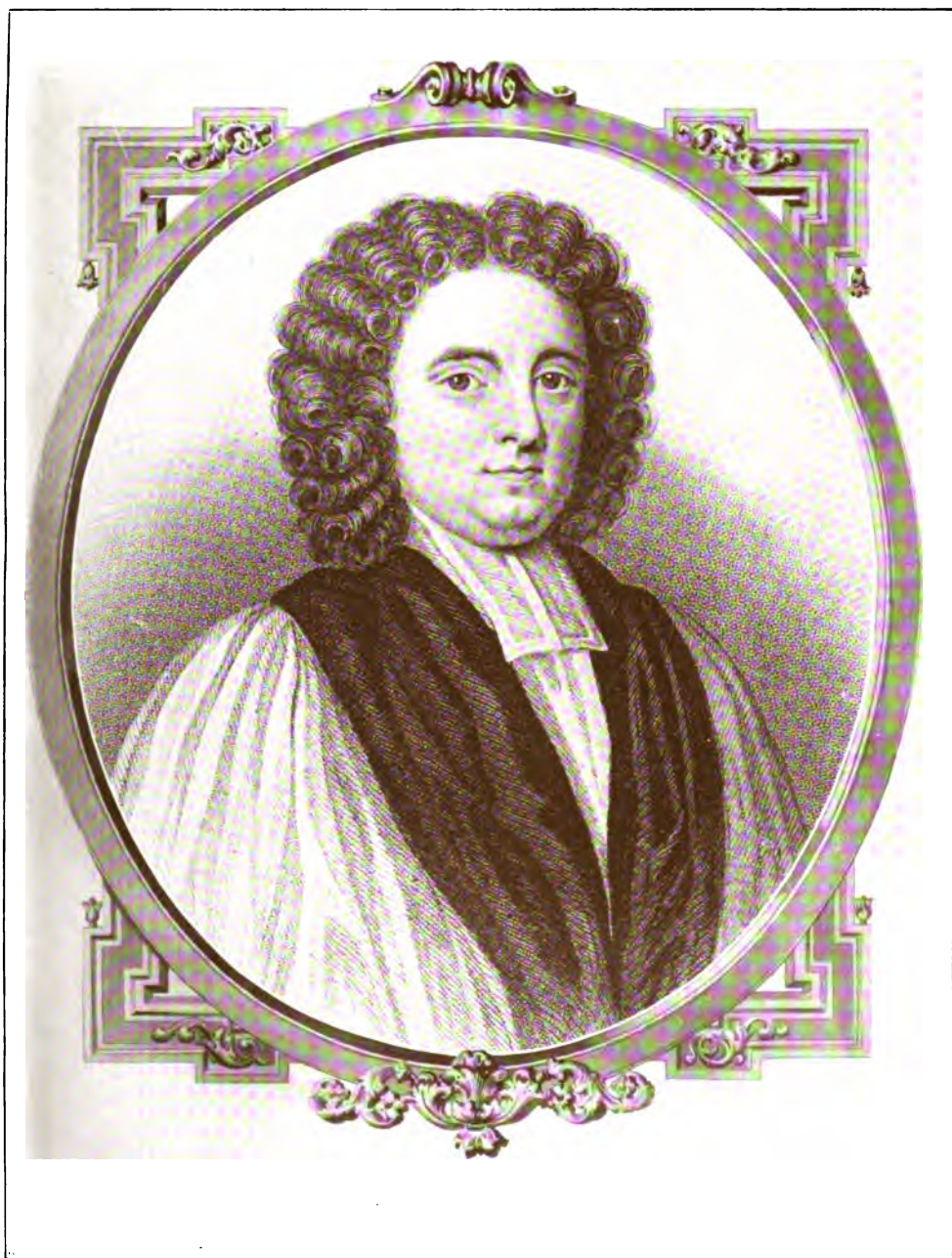
ways and on the strength of iron and steel; and was knighted in 1893.

Berkeley, Sir John, English nobleman, one of the proprietors of New Jersey: b. 1607; d. 28 Aug. 1678. He was a prominent Royalist during the contest of Charles I. with Parliament. Charles II. granted him, with Sir George Cartaret, a proprietary interest in New Jersey and Carolina.

Berkeley, Miles Joseph, English botanist: b. Biggin, Derbyshire, 1803; d. Sibbertoft, Leicestershire, July 1889. Educated at Christ Church, Oxford, he took orders, was curate at Margate (Kent) and Market Harborough (Leicestershire), and subsequently was made vicar of Sibbertoft. He soon became the leading British authority on fungi and plant pathology, and especially well known for his achievements in mycology. About 6,000 species of fungi are credited to him; his most important work was the section on fungi contributed to Hooker's 'British Flora' (1836), and his 'Outlines of British Fungology' (1860), and he assembled a fine herbarium of more than 9,000 species, now at the Kew Gardens, and regarded as one of the most noteworthy in the world. A bibliography may be found in the 'Catalogue of Scientific Papers' of the Royal Society. Consult, also, Vol. XLVII. (1890) of the 'Proceedings of the Royal Society' for a sketch by Hooker.

Berkeley, Stanley, English artist. He has constantly exhibited at the Royal Academy in recent years, and is a national gold medallist and a member of the Royal Institute of Painter Etchers. Among his paintings are 'The Victory of Candahar'; 'For God and the King'; 'Prince Rupert at the Battle of Edgehill'; 'Completely Routed'; 'An Australian Bush Fire'; 'Heroes of the Tugela'; 'The Meet'; 'Atbara'; 'Omdurman'; 'The Charge of Scarlett's Three Hundred'; 'Gordons and Greys to the Front'; 'Full Cry'; 'Desperate Odds'; 'Dargai'; 'Cornered at Last'; 'The Death'; 'The Charge of the French Cuirassiers at Waterloo.' He has also done much in the way of illustrating books and newspapers.

Berkeley, Sir William, American colonial governor: b. near London about 1610; d. 13 July 1677. His father and brother were colonial proprietors. Graduating from Oxford 1629, he traveled on the Continent for a year; was appointed a commissioner of Canada 1632, and won a high reputation there. In 1641 he was made governor of Virginia, and arriving in 1642, was for a time very popular. He experimented in the cultivation of rice, cotton, indigo, hemp, flax, and silk, the manufacture of potash and naval stores, and the cutting and export of masts; pleased the Royalist party by expelling the New England Puritans in 1643, and all parties by capturing the Indian chief Opechancanough in 1644, after a series of Indian massacres. Always with an eye to profit, however, he received from the king a monopoly of the fur trade. During the English revolution he adhered to the royal side, and offered an asylum in Virginia to exiled or dissatisfied Royalists; many hundreds availed themselves of this. When Cromwell felt strong enough he sent a fleet (in 1651) to bring him back for punish-



GEORGE BERKELEY.

BERKELEY — BERKHAMPSTEAD

ment; but Berkeley succeeded in making terms with it by mingled "bluff" and finesse, and was allowed to retire in safety to his plantation, though deprived of his office. When the Restoration began to seem probable, the colonists elected Berkeley as governor to gain favor in such event; Berkeley accepted it provisionally, and Charles II. on accession confirmed it. But in this second term all Berkeley's evil side showed itself, till it ended in the atrocities of 1676. Besides expelling and confiscating the goods of Puritans and Quakers, a measure popular at the time, he frowned on the establishment of schools, and absolutely refused to have a printing-press set up, as making people too censorious of their superiors. He formed a council of the wealthier planters, and having obtained during the spasm of Restoration loyalty in 1662 an ultra-royalist House of Burgesses, would not issue writs for another election for 14 years, simply adjourning annually the "Long Assembly," as it came to be called; and in 1670 abolished universal suffrage, substituting a property qualification, purely as a precaution for the future, as no elections were held for years before and after. These, however, were only means to the end of profiting himself and his friends, and the rapacious crew of civil officers sent over by Charles to quiet their importunities. The heavy taxes and fees imposed on the colony, drove them to desperation, so that as early as 1667 they were ripe for revolt. Besides Berkeley's share in various extortions, he had one monopoly which led directly to the catastrophe, that of the Indian trade, which he gained by underhand means. The colony allowed no trade with the Indians without license; Berkeley therefore licensed a small number of men to trade in furs with them, which secretly included liquor, firearms, and other things, and exacted a third of the profits. It was believed to be this gain which led him to refuse permission to the colonists to protect themselves against the Indians in 1675-6, while hundreds of them were being massacred and tortured and scores of plantations laid waste, and to dissolve force after force assembled to protect them. How Nathaniel Bacon chastised the Indians in spite of him, was proscribed for it, forced into open rebellion, drove Berkeley into retreat and burned his capital, and died at the moment of his victory, is told under 'Bacon's Rebellion.' Berkeley's soul was as full of senile fury as it had been of senile avarice; he slaughtered right and left, hanging a score of victims with such vindictive haste and ruffianly insult that the Assembly remonstrated, and the royal commissioners, who came in January to investigate the condition of the colony, made a report that led the king to remove him, with the comment, "The old fool has put to death more people in that naked country than I for the murder of my father." He sailed 27 April, his departure celebrated with bonfires and salutes of cannon; and expected to justify himself to the king and return. But Charles kept postponing an interview, and in a few weeks Berkeley died — of chagrin, it was believed.

Berkeley, Cal., a town in Alameda County, on the Southern P. R.R.; 8 miles northeast of San Francisco. It is the seat of the State University of California (q.v.); the State Agricultural College; the State Institution for the Deaf,

Dumb, and Blind; and six college preparatory schools. The town is well equipped with electric light and street railroads; and has soap works, iron foundries and machine shops, furniture factory, and other industries. Pop. (1910) 40,434.

Berkeley, England, a market town, 16 miles southwest of Gloucester, pleasantly situated on the right bank of the Avon, in the rich vale of Berkeley, and celebrated for its castle, where Edward II. was confined and barbarously murdered.

Berkeley Divinity School, an Episcopal theological school at Middletown, Conn. It was organized by Bishop John Williams of Connecticut while he was president of Trinity College, at Hartford, and was at first intended to be the theological department of the college. It was later placed upon an independent basis and removed to its present location. The value of its buildings is about \$90,000; and its endowment fund is not far from \$350,000.

Berkeley Sound, next to Stanley Sound the most frequented inlet of the East Falkland Island, near its northeast extremity. Though it is difficult to enter, it contains some of the best harbors in the South Atlantic.

Berkeley Springs, W. Va., a town and county-seat of Morgan County; 2 miles south of the Potomac and 77 miles northwest of Washington; on a branch of the Baltimore & O. R.R. It is in an agricultural region, and has been widely known and popular for more than a century because of its mineral springs. The site of the town was a part of the vast estate of Lord Fairfax, and Washington owned considerable property here. It is the oldest pleasure resort in the South, and as far back as the colonial days the gentry of Virginia came here in warm weather and lived in log huts in order to enjoy or be benefited by the baths and swimming pools.

Berk'enhout, John, Dutch-English physician and general writer: b. Leeds, about 1730; d. 1791. Having entered the Prussian service, he rose to the rank of captain. In 1756 he quitted that service and entered into that of England, where he obtained the same rank. At the peace in 1760 he went to Edinburgh and began the study of physic; while there he published his 'Clavis Anglica Linguae Botanicae,' a book of great merit, and later his 'Pharmacopœia Medici,' which passed through three editions. In 1778 he attended the British commissioners to America, and at Philadelphia he was committed to prison, but he soon afterward was set at liberty, and returned with the commissioners to England, where he obtained a pension. He was an industrious writer, and his publications possess considerable merit.

Berkhampstead, berk'häm-stëd, or **Berkhamsted**, Great, a town in Hertfordshire, England, beautifully situated in a hollow, surrounded by hills, on the London & N. W. R.R. It consists almost wholly of one main street, and has a fine old church, restored 1871-87; several chapels; Berkhamsted School, with a fine chapel (1895); a high school for girls; many other schools; etc. There are works for wooden ware, a large chemical work, a boat-building yard, brush, coach, and mantle factories, an iron foundry, etc. The poet Cowper

BERKHEY — BERLIN

was born here in 1731. In the small parish of Little Berkhamstead, some miles to the north, the famous Bishop Ken was born. Pop. about 6,000.

Berkhey, bĕrk'hî, **Johannes Lefranca van**, Dutch writer of eminence: b. Leyden, 23 Jan. 1729; d. there, 13 March 1812. His work, entitled '*Naturlyke Historie van Holland*,' first brought him into notice. He also distinguished himself as a poet, though he often manifests a tendency to bombast, and indulges in false pathos. One of his best poems is entitled '*Het Verheerlijkt Leyden*.'

Berkley, Va., a town in Norfolk County on the Elizabeth River opposite the city of Norfolk. It is on the Norfolk & W. and the Norfolk & S. R.R.'s. The Berkley College and Military Institute and several private schools are located here. Shipyards, foundries, and knitting-mills are also among the features of the town. Annexed to Norfolk in 1906 (q.v.).

Berkshire, a midland county of England, with an area of 450,132 acres or 712 square miles. Its shape is very irregular, and has been compared to that of a shoe or slipper. A range of chalk hills crosses the country in a westerly direction, and forms a boundary to the fertile vale of Whitehorse, so called from the gigantic form of a horse which has been scooped out on the side of a chalk hill, so as to become conspicuous to all the country round, referred to in Thomas Hughes' '*The Scouring of the White Horse*.' The cultivated parts of the county, and more especially this vale, are peculiarly fruitful in barley. They also contain much rich pasture and many excellent dairy farms. Timber abounds, particularly oak and beech, in Windsor Forest and toward the west. Turnips are an important crop. There are but few manufactures carried on in this county, the principal being agricultural implements and artificial manures, flour, paper, sacking and sail-cloth, and biscuits (at Reading). Malt is made in great quantities, and chiefly sent to London. The principal towns of Berkshire are Reading (the county town), Newbury, Maidenhead, Wokingham, Wallingford, Windsor, Abingdon, Wantage, and Farringdon. Pop. about 255,000. See Graves, '*The Way About Berkshire*' (1898).

Berkshires, **The**, or **Berkshire Hills**, a range of mountains in the northwest of Massachusetts; in Berkshire County; stretching 16 miles north and south on the east of the valley of the Upper Hoosic River. They are a favorite summer and autumn resort. The highest summits are Greylock in the north, 3,535 feet, and Mount Everett, or the Dome, in the south, 2,635 feet.

Berlad, bĕr-lăd', Rumania, a town on the Berlad River, and Teucuci-Baslui R.R., about 68 miles northwest of Bucharest. It is the trade centre of a grain-raising district and has many distilleries. It is a well built town, with good schools and a theatre.

Berleburg, bĕr'lĕ-boorg, or **Berleburger Bible**, a translation of the Scriptures published at Berleburg, Germany (1726-42). Its unknown editors have given an original version with accompanying exposition more or less mystical in character.

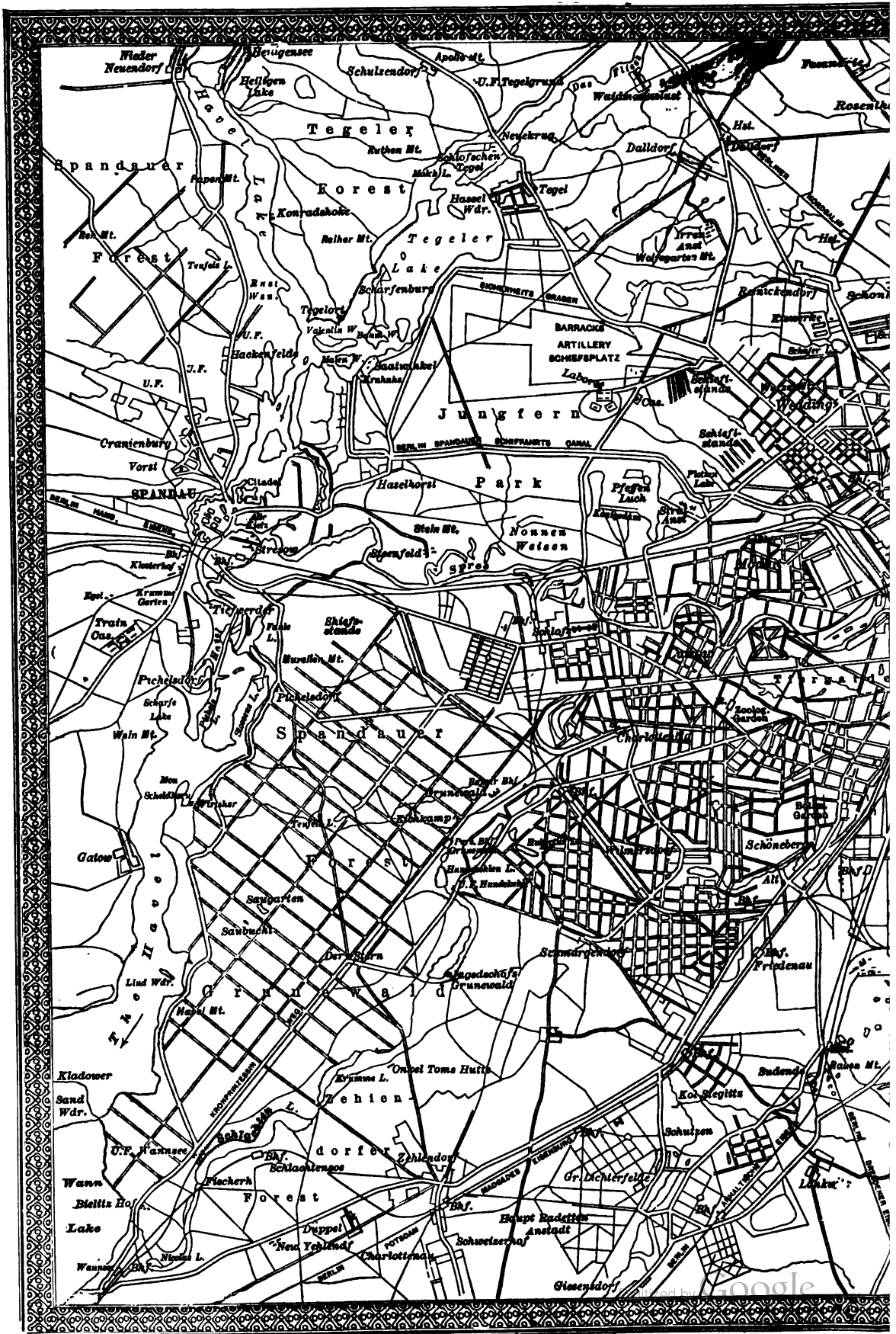
Berlichingen, bĕr'lin-ing-ĕn, **Götz**, or **Godfrey von**, German soldier of fortune: b. Jax-

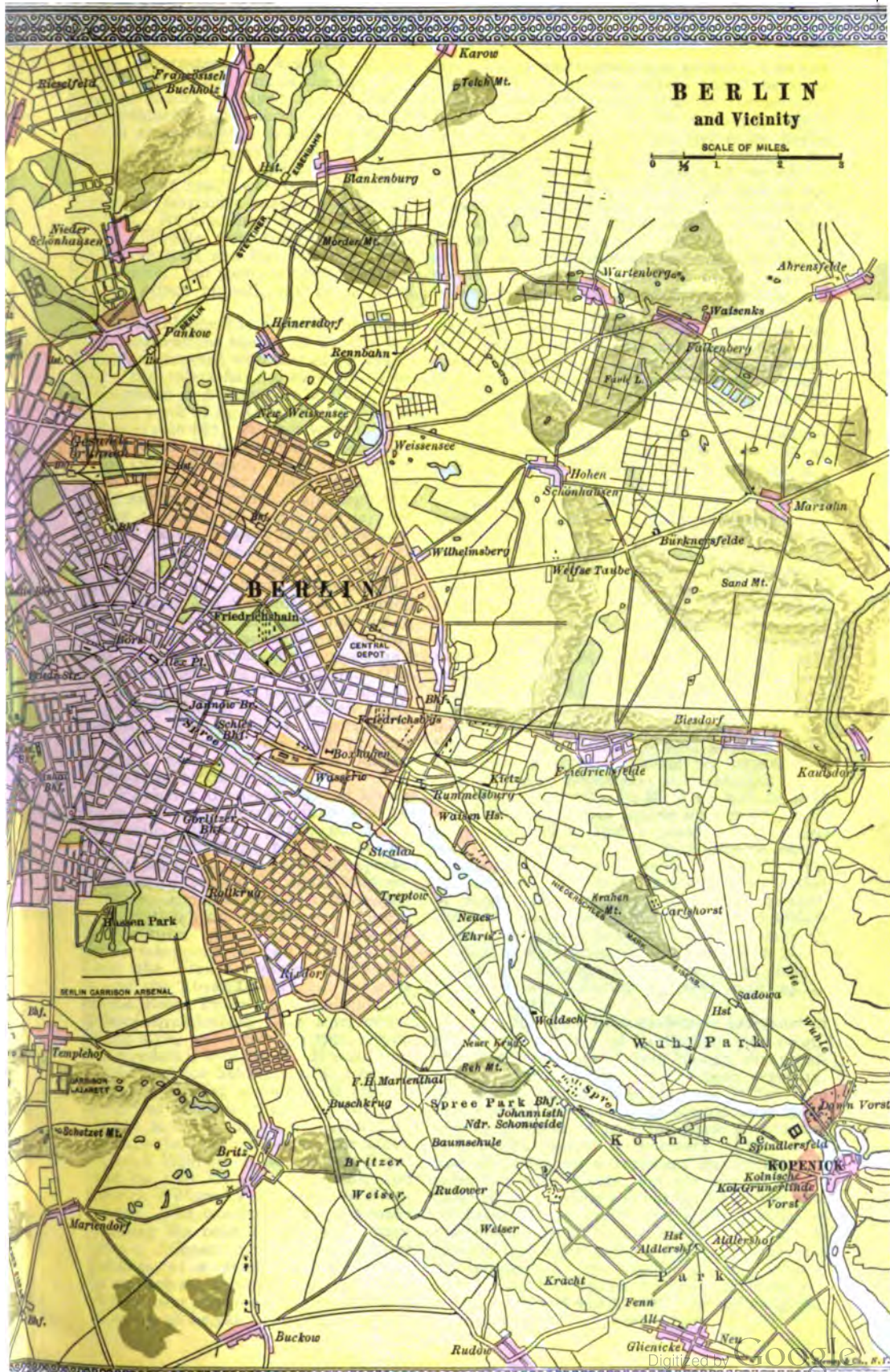
thausen, Swabia 1480; d. 23 July 1562. He was a bold, restless, warlike, and honorable knight. He placed himself at the head of a body of the rebellious peasants, in the war which they waged against their oppressors, but was soon made prisoner. Before that time he had lost his right hand, and therefore wore one made of iron. His biography, written by himself, was printed at Nuremberg in 1731 and 1775, and, for the third time, at Breslau in 1813. This book contains an excellent picture of the social life and customs of the time, and has furnished Goethe with the subject of his drama, '*Goetz von Berlichingen*,' translated by Sir Walter Scott.

Berlin, Canada, town and county-seat of Waterloo County, Ont.; on the Grand R. and the Grand T. R.R.; 62 miles west of Toronto. It has manufactories of furniture, leather, boots and shoes, pianos and organs, buttons, gloves, etc.; excellent sewerage system, waterworks, street railway, and gas and electric light plants; a Roman Catholic college, 15 churches, and several daily, weekly, and monthly periodicals. Pop. about 10,000.

Berlin. No account of the earliest settlement of Berlin has come down to us, but it is supposed that the city was founded during the decade from 1230 to 1240. Indeed, the margraves John I. and Otto III. are said to have established the city as a stronghold against the Slavs. The name Berlin is probably of Slavic origin, although some scholars trace the word to '*Bärlein*,' from the fact that a bear appears on the coat of arms of the city. The new city, or town, was situated on the old commercial highway which led from Leipsic to Stettin and was known especially as a market for herring, grain, and wood. Cologne (Colonia), the near-by sister city on the river Spree, seems to have been established as an independent municipality simultaneously with Berlin and was united with Berlin, temporarily, in the year 1307. Though the margrave had his castle in the city, the municipal government was left to the mayor and aldermen, who enjoyed full sway.

In 1134 the mark of Brandenburg had come into the hands of Albrecht the Bear, of the House of Ascan, to which family also belonged the founders of Berlin, who ruled in common. After the extinction of this family (1323) the German emperor, Ludwig of Bavaria, gave Brandenburg to his son Ludwig as a fief, who in 1351 passed it to his brother, Ludwig the Roman. His successor, Otto the Lazy, sold the mark to the emperor Karl IV. (1373). Karl's son, the emperor Sigismund, appointed Friedrich von Hohenzollern, burggrave of Nürnberg, viceroy of the mark in 1411 and made him an elector in 1415. This increased dignity, which indeed had already been worn by Ludwig the Roman, gave the ruler of the mark an importance that redounded to the good of the country and of the city. The first Hohenzollern had a difficult position to fill, in that he had to put down a rebellious and, in part, thievish nobility. This nobility, especially the family of Quitzows, did great damage to the trade of Berlin (1406-1410). Just as his father had had to contend with the nobility, Frederick II., the second Hohenzollern, had to fight against the populace of Berlin-Cologne. Soon after he un-





BERLIN and Vicinity

SCALE OF MILES.
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BERLIN.

dertook the government he began a strong citadel in Cologne, on the bank of the Spree.

This same citadel, enlarged and extended during the centuries, now serves the present emperor both as a residence, and as the palace where he receives his princely guests. With the building of the citadel the margrave removed to Berlin; and the result was that Berlin and Cologne had to surrender much of their authority to him. At first the cities had become involved in a dispute over constitutional and administrative matters and had called in Frederick II. as arbiter; but soon they were quarrelling with the prince himself, and he defeated both of them.

Since Berlin-Cologne has been the residence of the Hohenzollerns the history of the city has been intimately connected with that of the reigning family. The rulers have always been particularly interested in building up the city. In this respect the work of the Great Elector, Frederick William (1640-88), was noteworthy. He added two new wards to the city, Friedrichswerder and Dorotheenstadt, built magnificent fortifications (though later these were removed), and summoned architects and engineers from Holland to finish the palace and lay out public grounds, as the Lustgarten and the Linden-promenade. His successor, Frederick III., the first king of Prussia, added to the city Friedrichstadt and other suburbs. Supported by artists like Schlüter and Eosander he enlarged and beautified the palace and gave the city a number of fine statues and public buildings, particularly the Zeughaus, which is one of Berlin's conspicuous monuments of architecture. The fine equestrian statue of the Great Elector, on the bridge near the palace, is by Schülter. Frederick William I. was especially interested in building private residences. He made presents of building-lots and even furnished lumber gratis and made other concessions.

His son, Frederick the Great, turned his attention to the erection of new buildings in Potsdam, his favorite residence. After the Seven Years' War, in which Berlin had been burned twice, the king began, at great personal expense, the construction of houses for those who enjoyed his favor. External architectural beauty was aimed at, rather than convenience. Among the public structures erected by Frederick the Great may be mentioned the two domes of the German and the French church, the King's Colonnade, and the Royal Library. In 1763 he established the Royal Porcelain Manufactory.

The famous Brandenburg Gate, a triumphal arch in classic style, was erected in 1793, during the reign of Frederick William II. It was ornamented by the sculptor Schadow with a bronze statue of Victory driving a four-horse chariot. When Berlin was taken by the French in 1807 this was taken to Paris, but was recovered in 1814 after Paris had been taken by the allies. Under Frederick William III. the present Royal Theatre and the Old Museum were built, and under Frederick William IV. the statue of Frederick the Great. The wonderful progress made by Berlin during the reign of William I. gave the city quite a different appearance in a short time. Buildings of a monumental character, both public and private, sprang up everywhere.

This development continues; and the present emperor is doing all he can to beautify the city,

chiefly with monuments and statues. Likewise the activity of private citizens along the same lines is now far greater than in former centuries. The great historical events which created the German Empire and made Berlin the capital of it found a happy echo in the populace. The new development of the city to the metropolis of the political life and of national and international trade has not been external and artificial as formerly, but has been internal and necessary. This fact cannot be set forth in an account of buildings and monuments. It would be necessary to examine the statistics of trade and commerce, of banking, and of the industries, etc., etc. If one studies the statistics, then it becomes clear that those material aspects of the city that amaze one and compel admiration are the only manifestation of a powerful historical development, which cannot by any means be regarded as having reached its zenith.

Area, Population, Suburbs, etc.—Besides Cologne, other neighboring towns were built up later, as Friedrichswerder (with Friedrichstadt), and Dorotheenstadt. All four of these towns, though lying in immediate proximity to one another, remained completely independent of each other till 1709, when Frederick I. fused them into one municipal corporation. At that time the population was about 57,000. Now, after nearly 200 years, we find a similar situation as regards a plurality of independent cities. Immediately adjoining Berlin there are some 20 completely independent municipalities of one kind and another. For the most part these towns and cities have, to all appearance, become fused with Berlin, and boundary lines have been obliterated; but each one has its own independent municipal government. As yet there is no centralized, unifying government to bind them together. Among the larger cities thus related to Berlin may be mentioned Charlottenburg, with 237,000; Rixdorf, with 153,000, and Schöneberg, with 141,000 inhabitants. Berlin proper had in 1908 a population of 2,140,000; or, including the immediate suburbs, nearly 3,000,000. The area of Berlin is 6,350 hectares (1 hectare = $2\frac{1}{2}$ acres), being less than that of several other German cities, for instance, Cologne (11,100 hectares), Frankfurt-on-Main (8,000 hectares), Strasburg (7,800 hectares), Munich (7,500 hectares), and Mannheim (6,600 hectares). Though, to be sure, if we include the immediate suburbs, the area runs up to 16,500 hectares.

There has been no considerable extension of the corporate limits of Berlin into this neighboring territory since 1860, though the necessity for such a proceeding has been urged repeatedly in various quarters. To do this, and thus effect a union of these several municipalities, the consent of both the State government and the Parliament is necessary. For a long time the Prussian government was inclined to carry out such a plan, but the city of Berlin objected to assuming the burden which the poor condition of the streets and public utilities of the suburbs would have imposed upon her. At present the State government encourages the incorporation of the smaller country suburbs into towns, and sooner or later all these elements, large and small, will be brought together under one municipal government.

The present fragmentary condition of the city entails upon Berlin many practical difficulties. For instance, the city has bought in the suburbs not less than 14,200 hectares of land for the utilization of the sewage, and the laying of the pipes through these neighboring municipalities often gives occasion for long and tedious negotiations. Similar difficulties attend the construction of street-car lines. In every case the company in question has to secure a concession from every suburb concerned. This always involves long negotiations as to details.

Municipal Government.—The administration of the city of Berlin is in the hands of a municipal council of 34 members, including the mayor. Half of these fill honorary positions, half receive pay. Among the salaried members may be mentioned, the chief mayor (Oberbürgermeister), the mayor, two syndici, a minister of finance, two school commissioners, and two commissioners on buildings. The members of the council are elected, for a limited period, by the board of aldermen. The aldermen themselves are elected by vote of the citizens. The sessions of the council are secret; those of the board of aldermen are usually public. All important innovations require the consent of both bodies. Besides, there are a number of committees, composed of members of the council and of the board of aldermen. In certain branches of the administration the authority of these committees is competent, but in important matters transcending their special departments their authority is conditioned by the consent of the municipal council.

The aldermen, 144 in number, receive no salary, their position being honorary. They are represented by a chairman and his deputy. A further category of honorary and unsalaried officials is formed by the citizen-deputies, who are elected by the board of aldermen; also the poor-law guardian and the members of the poor commission. Altogether, there are several thousand persons working for the city without any salary. The city police force is employed and controlled by the State, but the city has to make appropriation for this object.

Finances.—The administration of the city of Berlin costs something more than \$35,700,000 yearly. The city owns real estate worth \$110,000,000, and other assets to the extent of \$170,000,000. The obligations of the city run up to about \$80,000,000.

The receipts come principally from taxes. The taxes collected for the current year amount to about \$20,000,000, i.e., about \$10 per head. Of this amount \$7,400,000 was from the income tax. This tax is levied on incomes just as is the corresponding State tax, and at present the rate is the same in both cases. Further, \$2,260,000 was realized from the special tax assessed against incomes derived from trade. The tax on real estate was \$6,400,000, to which must be added a sewage tax of \$1,450,000. The tax on transfers of real estate was \$1,300,000, not to mention other and less important sources of income. It may be added that the State taxes in Berlin, direct and indirect, amounted to \$7,740,000 and \$11,900,000, respectively, while the imperial taxes were \$13,100,000. Thus we see that in the year

1904-5 the citizen of Berlin paid, on an average, about \$25 in taxes.

Of the expenditures, schools and education received \$6,550,000. Other items were, gas manufacture, \$5,000,000; administration, \$4,200,000; charity, \$3,800,000; interest on loans, \$2,850,000; care of health, \$2,620,000, and \$1,790,000 borrowed money returned. In considering these figures it must be noted that general indebtedness forms a separate account, the expenditures under this head not being reckoned to the departments concerned; further, that the commercial enterprises of the city, as gas-works, water-works, sewage, stock-yards, slaughter-houses, etc., are included in the general budget.

Public Utilities.—As regards gas and lighting, the city has not a monopoly. By reason of old contracts a small part of the city is entirely dependent for gas on an English company, and the same company operates, but not exclusively, in a large part of the city. The water supply is entirely in the hands of the city. There are several water-works, the water being obtained in part from deep wells. Other wells are to be bored soon. Sewage is also provided for by the city, the waste being brought through pressure pipes to the city's farms in the country, where it is prepared for agricultural purposes.

The city has a stock-yard, which serves as a general market for live stock, also a slaughter-house, where all slaughterings must take place. Here the fresh meat is at once officially inspected. All meats shipped into Berlin are inspected, unless an official inspection has taken place elsewhere. There are 14 city market-houses for the retail trade and one special market-house for the wholesale trade.

There are five regular city hospitals and a smaller sick-house, which are open to the public; also three State hospitals and nine other public hospitals. The large Virchow city hospital is in course of construction. Besides, there are three city asylums for the insane. The city also maintains a disinfecting establishment for furnishings, flats, etc. There are seven public bathing places for hot baths, and 16 with cold running water.

The city also runs a savings bank ("Sparkasse"). The deposits amount to some \$75,000,000. There is also a royal pawn-office, and a number of private benevolent institutions which are, in part, supported by the city.

The Central Employment Office is of particular significance; and its management is unusual. In many German cities such an institution is managed directly by the city administration. A special office is fitted up for the purpose, notices of vacancies of one kind and another are received, and those seeking employment are informed of such opportunities for work. Now, in Berlin, this general employment agency is not directly in the hands of the city, but receives support from the city. This support on the part of the city, which has been extended to \$10,000, was given after a number of high city officials had identified themselves with the management of the agency in question, which was called the *Central-Verein*. This employment agency has a special building for its purposes, containing separate offices for different kinds of work; also youthful applicants are separated from the mature. A number of

BERLIN.



1. Schlossbrücke, with Lust Garten.
2. Palace of Emperor William I.

smaller employment agencies and unions of one kind and another have joined this general union. The condition for this joining is that an executive committee be formed for each trade, consisting equally of workmen and employes, with a chairman belonging to neither party.

Charities, etc.—The city council spends annually about \$80,000, aiding various private charitable associations; for instance, nine organizations for nursing the sick, 15 for the care of children, five for the care of women lying-in, and 43 other aid associations; also 23 educational institutions, besides a large number of foundations partly under the administration, partly under the inspection of the city.

The city has two asylums for the homeless, one for families, the other for such persons as only require a shelter for the night. A similar institution, an "Asyl," is maintained by a private association. In fact, it is characteristic of Berlin that public and private charity supplement each other. The care of the poor, as such, is in the hands of the city administration, and about 4,000 persons are employed in this work, though in honorary positions and without salary. The daily expenditure on the poor is about \$13,000, the average number receiving aid being 34,000. The number of orphans in the care of the city is about 6,000.

In addition to these means of providing for the poor must be mentioned the system of insurance for the working classes. The statute regulating insurance against sickness was passed in 1883, though previous to that time such insurance had already been made compulsory. The obligation is placed upon the employer, who pays the assessments and deducts the amount from the wages of the workman. At present there are 129 branches of this kind of insurance under the control of the city council, besides a few branches that are controlled by the State, and a number of private associations. The number of workmen and women insured already exceeds 700,000, and in 1910 about \$7,000,000 was paid out in sick insurance. According to the law, the weekly allowance during sickness is paid for as long as 26 consecutive weeks, but, under special circumstances, it may be paid for as long a period as 52 weeks. The city has built upon its own land homes for the convalescent, which are for the complete recovery of the sick. For the rest the city hospitals are open to the insured, but their expenses must be paid out of the insurance money.

There is in Berlin a State institution for the care of invalid workmen. In connection with the same there are several sanatoria which care for those who are about to become invalids. The sanatorium at Belitz may be mentioned. It is fitted up in magnificent style and is probably the best sanatorium on the continent of Europe.

Educational Institutions.—In the field of education the University of Berlin takes the first place. It was founded by Frederick William III. in 1810. During the winter term of 1910 there were enrolled over 7,500 regular students, besides almost as many more so-called *Zuhörer*, i.e., mostly persons who have secured permission to attend lectures, but whose previous education is not sufficient to enable them to take up systematic studies lead-

ing to a degree. In connection with the university is the Seminary for Oriental Languages.

Further, of special significance is the "Technische Hochschule," which has nearly 3,000 students; also the "Bergakademie," and the *Hochschulen* for agriculture, for fine art, and for music.

All these are State institutions. To them will soon be added a Hochschule for Commerce, which is being erected by the "Ältesten der Berliner Kaufmannschaft." This is a society of merchants which was licensed by Frederick William III. in 1820. Formerly they exercised the function of a board of trade. Since the Chamber of Commerce was formed some years ago they have had to give up this function and have extended their activity into the field of commercial education.

As to Gymnasias and Realgymnasias, Berlin has five royal and 20 city institutions. There are, besides, 13 city Realschulen, two royal, and six city high schools for girls, four city finishing schools, a normal school, a royal seminary for male teachers, a similar one for female teachers and teachers of gymnastics, a royal theatre-school and school for deaf-mutes, a city school for deaf-mutes, and a city school for the blind. Elementary instruction is represented by 273 city district schools, with 5,000 teachers, 222,000 children, and 4,800 classes. Instruction in these schools is free. It may be added that each of the suburbs has its own schools of various kinds.

Museums and Collections.—The more important picture galleries and collections are, the Old and the New Museums, the National Gallery, the Pergamon Museum, and the Emperor Frederick Museum—all maintained by the State. Further, the Ravené Museum. Among historical collections may be mentioned the Royal Hohenzollern Museum, the Zenghaus, the Provincial Museum—a city institution, the Post Museum, and the royal museums for anthropology and German ethnology. The liberal arts are represented by the Royal Museum for Liberal Arts and by the exhibit of the Royal Porcelain Manufactory. Further, there are the royal museums for science, for agriculture, for mining and smelting, and for pathology. The Zoological Garden belongs to a private company, but it is in the nature of a public utility. The Aquarium is also owned by private parties, but is subventioned by the authorities. The State maintains a botanical garden. There is also the Hygienic Museum, the Colonial Museum, and the Institute for Hydrography, which serve further the interests of science and the technic of shipbuilding. A curious recent creation is a permanent exhibition of contrivances for the betterment of the conditions of labor. There are three astronomical observatories, a State observatory, and two private ones. The latter are always open to the public.

Many libraries, including the Royal Library of about a million volumes, provide opportunities for study in every field of knowledge.

Monuments and Public Buildings.—There are a large number of monuments on the streets and public squares of the city. A considerable number of them have been erected during the reign of the present emperor, and, in fact, under his immediate influence.

The number of the palaces and public build-

BERLIN

ings is likewise very large, though, as compared with other German cities, Berlin is poor in specimens of old architecture.

There are numerous theatres, including the Royal Play House, the Royal Opera House, the New Royal Opera-Theatre, 13 other large theatres, and about a dozen smaller ones, a number of so-called "cabarets," and two permanent circuses.

Churches.—The oldest churches in Berlin are the Nikolai Church and Saint Mary's. Both were built in the 13th century but have been restored. Further, Saint Peter's may be mentioned. There are more than 40 evangelical churches, the most important being: the Emperor William Memorial Church, built in 1891-1895 in beautiful Romanic style (two large neighboring houses are in the same style of architecture); the Emperor Frederick Memorial Church, beautifully situated in the Thiergarten; and the New Cathedral (dedicated in 1905), built in Italian Renaissance style and ornamented with numerous sculptures. A French church was built in 1701-1705; and there are also an English and an American church. Saint Hedwig's Church (Catholic) dates from the middle of the 18th century. Of the two larger synagogues the oldest and finest dates from the year 1866.

Monumental Buildings.—To be mentioned here especially are: the Royal Palace, the palaces of Emperor William I., Emperor Frederick, and Prince Albrecht, and the palace at Charlottenburg; further numerous state buildings, *e. g.*, those occupied by the Departments of War and Education, the Foreign Office, the Imperial Health Office, the Imperial Insurance Office, the Patent Office, the Abgeordnetenhaus, and the large Reichstag building, in Italian Renaissance style; also various railway stations and palatial structures of the Postal Department. Of municipal buildings the City Hall deserves mention; further, the city museum and numerous public schools; also the new City Hall in Charlottenburg. The magnificent structures of the large banks, stores, breweries, insurance companies, etc., add much to the beauty of the city. The arcade between Frederick street and Unter-den-Linden may also be mentioned.

Bridges, Statuary, Fountains.—The following are the more notable of the monumental bridges in Berlin: Heydtbrücke, Potsdamerbrücke, Belle Alliancebrücke, Kurfürstenbrücke, Wilhelmbrücke, Friedrichbrücke, Schlossbrücke, Moltkebrücke, and Oberbaumbrücke. Aside from the National Monument, the most noteworthy statues in the central part of the city are those of William I., Frederick the Great, the Great Elector, Frederick William III., Emperor Frederick, Empress Augusta, the two Humboldts, Helmholtz, Luther, Schiller, Waldeck, and Schulze-Delitzsch. In front of the Reichstag building is an immense bronze statue of Bismarck. Near by are the statues of Moltke and Roon and the Column of Victory, which overlooks the 32 marble groups of Brandenburgian and Prussian statesmen and rulers in the Avenue of Victory. Other notable statues in the Thiergarten are those of Goethe, Lessing, Richard Wagner, Frederick William III., and Queen Louise. Some of the numerous fountains worthy of note are: the large fountain before the palace, which was designed by Begas and

presented by the city on the accession of the present emperor; the Hercules Fountain on Lützowplatz, which was designed by Lessing; further, the artificial water-fall in Victoria Park.

Transportation and Population.—The character of the population of Berlin is subjected to a gradual change, which is caused partly by the building up of new industries, partly by the removal of well-to-do taxpayers to the suburbs. This migration of the wealthier classes is attended by an influx of the laboring classes, especially in the newly-built parts of the city, so that the laboring population is constantly increasing. Again, the inner residential part of the city is coming to be used more and more for business purposes, so that here the population is decreasing continuously.

The development of facilities for transportation has contributed much to these changes. The "Stadtbahn," a railway which crosses the city from east to west, then encircles it both on the north and on the south, was and is yet the cause of the wonderful growth of the western suburbs. Migration was encouraged by the exceedingly low fare of 10 pfennigs to the fifth station, or 20 pfennigs for the entire distance, not to mention the great reduction allowed on monthly tickets. This has led to the building of new stations along the outer parts of the "Stadtbahn" and to the institution of suburban trains, on which one may have a monthly ticket at a price varying with the distance.

In this connection must be mentioned also the "Grosse Berliner Strassenbahn." This is a private traction company which owns nearly all the street cars in the city. Since on most of the lines the fare is only 10 pfennigs this company has had great influence in the development of the suburbs. In the inner part of the city there are many omnibuses, drawn mostly by horses, but partly by motors. The fare is 5 and 10 pfennigs. The electric elevated and underground road passes along the southern periphery of the city from east to west. The prices are higher than on the other lines. A plan is now being agitated to supply Berlin with a number of such subways.

In the year 1910, the "Stadtbahn" carried 111,000,000 persons; the street-car lines, 395,000,000; the omnibus lines, 94,000,000; the elevated-subway line, 32,000,000.

Under the influence of improved facilities for transportation the composition of the population in the various parts of the greater city has become quite varied. The well-to-do live in the west and in the western suburbs, while the working classes have settled in the east and the north, and partly in the southeast. The large factories are situated in the east and in the northwest. While in Berlin 80 persons out of every thousand pay tax on an income of \$750 and upward, the proportion of people in Rixdorf, a southeastern suburb, who have such an income is only 27 out of a thousand. On the other hand, in the wealthy western suburbs, Grunewald and Wilmersdorf, the proportion is 441 and 228, respectively, out of every thousand. Similar differences can also be noted in the interior of the city.

The city maintains a statistical bureau that keeps a careful record of all these conditions. Undoubtedly, such differences in the composition of the population will be found to account

BERLIN.



1. Lust Garten, showing Statue of Frederick William III
2. Brandenburg Gate.

BERLIN CATHEDRAL

for the varying rate of mortality in the different parts of the city, as well as for the varying rate of taxation.

Death Rate.—To be sure, the mortality in Berlin is not only low, but is still decreasing. In 1904 the rate was 17 out of a thousand, while in the seventies of the past century the death rate was almost double this. Still, the rate is not uniform, varying from 8 in the wealthier parts of the city to 22 per thousand in the poorer quarters. The decrease of mortality is due to better hygienic conditions, especially to water-supply and sewage. Though the death rate among children is still high the city authorities are doing everything possible to combat the evil. Building ordinances have been made stricter, and the hygienic conditions of flat-houses have been thereby greatly improved, especially in the newly-built portions of the city.

Tenements.—Still the principal evil persists, i.e., the crowded condition of apartment-houses. On an average such a house in Berlin shelters 77 persons, and the flat of a workman, which usually consists of only two rooms, closet, etc., must not only shelter the family, but provide sleeping quarters for one or two outsiders. The explanation of this is to be found in the relatively high rents for such flats, the minimum being \$5 per month, or about one fourth of a laborer's income. The desire to cut down the rent by letting sleeping quarters is amply met by the large number of workmen moving into Berlin.

The building of model tenements for the betterment of living conditions among the poor has not taken place to any considerable extent. Aside from a co-operative company that built 269 small homes for workingmen in the suburbs, which were sold to the members of the company, there are seven building companies of philanthropic nature, but their houses offer accommodations for less than 10,000 persons. Besides, the administrations of some of the State industries have placed homes at the disposal of their workmen, and both the city and the State aid such benevolent enterprises by furnishing capital at a low rate of interest.

Aside from the evils of high rents, and, consequently, overcrowded flats, the conditions are not bad. The plumbing in the newer flat-houses leaves nothing to be desired. In fact, both in Berlin and the suburbs, the better class of such houses have all modern conveniences, and are comparatively luxurious.

Streets.—The streets of Berlin are well cared for and are in excellent condition. Already 40 per cent. of the streets are paved with wood or asphalt, the rest being paved with stone or cement. But the work of improvement continues. The yearly pay-roll for street cleaning amounts to \$531,000. Much more is spent now on parks than formerly. Within the city limits there are seven State and five city parks. For the most part, the city is illuminated by gas, but, since recently, in part by electricity. The city maintains an efficient fire department, which also acts as a good Samaritan in all cases of distress, whether from fire or otherwise. In accordance with an ordinance of more than a hundred years standing, all buildings must be insured in the city "Feuercasse." The average insurance valuation per house is \$41,500.

Naturally, the great demand for real estate

and the more luxurious style of architecture have increased valuations considerably. On an average property is worth about \$65 per square metre. The total real valuation may be placed at about \$2,000,000,000.

Climate.—The mean temperature is 9° Centigrade, the thermometer varying from about 0.7° below zero in the middle of January to 19° above zero in the middle of July. During the months of December, January, and February the mean temperature varies from 0.7° below zero to 0.8° above zero. The mean temperature for other months is as follows: March, 3.5°; April, 8.5°; May, 13.3°; June, 17.4°; July, 18.9°; August, 18.1°; September, 14.6°; October, 9.5°; November, 3.8°. The mean barometer is 76.2, the lowest, 56.9 centimetres. West winds prevail.

While, in general, healthful, the climate has been found to be unfavorable to young children in the summer. Stomach troubles are aggravated by the heat, and the death rate among infants is thereby considerably increased. The city has been free of epidemics for years.

Recent Development.—Since about 1865 the capital city of the empire has had, in many respects, a brilliant development. In this short period the population has trebled, hygienic conditions have been wonderfully improved, and the city has become one of the most beautiful, and one of the most visited, cities in the world. More than a million strangers register in the hotels annually, not including the large number of visitors who find their temporary quarters in those parts of the greater city which are under separate municipal control. Indeed, for the stranger, who cannot see the imaginary boundary lines, it is all Berlin. Socially and industrially it is really only one city, and the entire complex of separate municipal corporations might be fittingly called Greater Berlin.

Doctor E. HIRSCHBERG,

Director of Statistical Bureau of Berlin.

Berlin Cathedral. This edifice was planned by the emperor Frederick and his empress to be the "Westminster Abbey" of Germany, and has been 14 years in building. The architecture corresponds nearly to the Italian Renaissance, and is the design of Prof. Raschdorff, who had visited all the principal cathedrals in Europe before completing it. The corner stone was laid in 1894. The cathedral consists of four principal parts—the church for divine worship the church for marriages and christenings, the immense crypts, and the long porch. It is constructed of yellow sandstone and the pillars of the porch are of vari-colored marbles—Brazilian anyx, black Silesian marble, and various beautiful specimens from Sienna. The building is 341 feet long; the cupola, with its lantern, rises 325 feet above the pavement, and the two bell towers each reach up to a height of 211 feet. The Prussian Diet contributed \$2,500,000 toward its erection, but this sufficed only for the actual building the extensive decorations and mosaic work being hardly yet begun, and the entire building will probably cost more than \$5,000,000. Emperor Frederick originally intended the memorial church in the crypt to be the resting place of the Hohenzollerns only, and already the remains of

BERLIN CONGRESS—BERMUDA

87 have been placed there, but in future the church will be the burial place, beside the sovereigns, for the nation's celebrated dead. The organ, which is the largest in the world, except that at Riga, has 113 so-called voices and 7,000 tubes. It cost \$37,500 and was the gift of Prince Henckel of Donnersmarck. The chancel is of marble and bronze and is the gift of Privy Councillor Paetel. Kaiser Wilhelm has taken great interest in the erection of the building, and by his direction an epitaph in memory of Bismarck will be placed over the entrance. The cathedral was dedicated 27 Feb. 1905.

Berlin Congress, a gathering at Berlin, Germany, where the European powers undertook the settlement of the questions growing out of the Russo-Turkish war of 1877-8. The Congress met 13 June 1878; and completed its labors with the signing of a treaty on 13 July following. The treaty of San Stefano (3 March 1878) between Russia and Turkey did not suit the other powers; and the congress, convened, at the suggestion of Germany, so modified the agreement between Russia and Turkey that the former lost nearly all the fruits of victory. By the new arrangement Bulgaria was divided into two parts, Bulgaria proper and eastern Rumelia. Parts of Armenia were given to Russia and Persia; the independence of Rumania, Servia, and Montenegro was guaranteed; Bosnia and Herzegovina were transferred to Austria; and Bessarabia restored to Russia. Greece was also to have an accession of territory. By a separate arrangement previously made between Great Britain and Turkey, the former got Cyprus to administer. Bismarck was the president of the congress. The more important members were: Prince Gortchakoff, Count Andrassy, Lord Beaconsfield, Lord Salisbury, M. Waddington, Count Corti, Karathéodori Pasha, Prince Hohenlohe, and Gen. von Bülow.

Berlin Decree, a decree issued by Napoleon, 21 Nov. 1806, which declared the British Islands in a state of blockade. It forbade commerce with them and trade in their merchandise, and declared all merchandise belonging to Englishmen, or transported from England, lawful prize. Its effect was to inflict great injury on the American carrying trade.

Berlin, University of, a celebrated institution of learning in Berlin, Germany. It is, with the exception of Bonn, the youngest of the German universities, but is probably the most famous of them all. It was founded in 1810, when the Napoleonic victories had left Prussia apparently crushed, and had even transferred her great University of Halle to the newly formed kingdom of Westphalia. Wilhelm von Humboldt was minister of education at the time, and Prussia's debt to him for organizing her national school system, with the University of Berlin at its head, during that period of national defeat and disaster, is certainly very great. It should be borne in mind, too, that Humboldt was ably seconded by Fichte and Schleiermacher. The first rector of the university was Schmalz; the first deans of its faculties were Schleiermacher, Biener, Hufeland, and Fichte; and before it was 10 years old it had for professors such men as Niebuhr, Wolff, Böckh, Bekker, and Hegel. In more

recent years, Ranke, Mommsen, Helmholtz, Virchow, and other famous scholars have upheld the reputation which the university won for itself at the very start. There are four faculties, theology, medicine, jurisprudence, and philosophy, with a total of 377 professors and teachers. At the satisfactory completion of the course, the doctor's degree is conferred.

Berliner, Emile, bār-lē'nēr, ā'mēl, American inventor: b. Hanover, Germany, 20 May 1851. After graduating at Walfenbüttel in 1865, he came to America five years later, and in 1878 was appointed chief inspector of instruments by the Bell Telephone Company. He invented the loose contact telephone transmitter or microphone, known by his name, and the device called the gramophone. He has devoted his energies to perfecting the telephone, and has secured many patents for his inventions.

Berlioz, bār-lē-ōs, Hector, French composer: b. Côte St. Andre, near Grenoble, 11 Dec. 1803; d. Paris 9 March 1869. He forsook medicine to study music at the Paris Conservatoire, where he gained the first prize in 1830 with his cantata 'Sardanapalus,' enabling him to study at Rome. His chief literary works (besides his 'Memoirs') are the 'Traité d'Instrumentation' (1844); 'Voyage Musical' (1845); 'Les Soirées d'Orchestre' (1853); and 'A Travers Chants' (1862). His musical works, which display remarkable originality, belong to the Romantic school, and are especially noteworthy for the resource they display in orchestral coloring. His more important works are 'Episode de la Vie d'un Artiste'; 'Symphonie Fantastique' (1829); 'Lélio, ou Le Retour à la Vie' (1832); 'Harold en Italie' (1834); 'Romeo et Juliet' (1839); 'Damnation de Faust' (1846), one of the best-known and most admired of his works; the operas 'Benvenuto Cellini' (1838); 'Beatrice and Benedict' (1862); and 'Les Troyens' (1864); 'L'Enfance du Christ' (1854), the 'Te Deum,' and the 'Requiem.' After his death appeared 'Mémoires' (1803-65), written by himself (English translation, 2 vols. 1884).

Berm, or Berme. In fortification, a narrow, level space at the foot of the exterior slope of a parapet, to keep the crumbling materials of the parapet from falling into the ditch.

In engineering, a ledge or bench on the side or at the foot of a bank, parapet, or cutting, to catch earth that may roll down the slope, or to strengthen the bank.

Bermejo, bër-mā'hō, a South American river rising in Bolivia, and flowing across Argentina to the Paraguay River, which it enters about 140 miles south of Ascension. It is navigable for about half of its length of 1,300 miles.

Bermuda, bër-mū'da, or Somers Islands, a cluster of small islands in the Atlantic Ocean, belonging to Great Britain, and situated 580 miles southeast of Cape Hatteras. They are in number about 400, but for the most part so small and so barren that they have neither inhabitants nor name. They were first discovered by Juan Bermudez, a Spaniard, in 1522; in 1609 Sir George Somers, an Englishman, was wrecked here, and after his shipwreck, formed

BERMUDA GRASS — BERN

the first settlement. The most considerable of these islands are St. George, Bermuda or Long Island (with the chief town, Hamilton, forming the seat of the governor), Somerset, St. David's, and Ireland. They are chiefly used as a naval and military station. The island of Ireland is occupied by a government dockyard and other naval establishments, while Boaz and Watford islands have the military depots. The military headquarters are at Prospect. An immense iron floating-dock was constructed at London for the Bermudas in 1868; it is capable of receiving a vessel of 3,000 tons. The climate is generally healthy and delightful, the air being mild and moist at all seasons. It is not adapted, however, for consumptive patients. The thermometer seldom falls below 40° F., and rarely rises above 85°. These islands have therefore become a popular holiday resort for Americans, and plentiful hotel accommodation is supplied at St. George's and Hamilton. The surface is rather irregular; the soil, though light and stony, is in general rich and fertile. The islands form a nearly continuous chain, and are connected almost uninterruptedly by roads, bridges, and causeways. The water is in general salt; there is but little fresh except rain-water, preserved in cisterns. The inhabitants export early potatoes, onions, lily bulbs, etc., nearly all of these products being shipped to New York. The value of the exports is from \$585,000 to \$635,000 annually; that of the imports is about \$1,460,000 to \$1,560,000. The revenue is about \$166,000. Pop. about 18,000. •

Bermuda Grass (*Cynodon dactylon*), a grass cultivated in the West Indies and the United States, where it is of special value on the sandy soils of the southern States. It is a valuable fodder grass for warm climates. It will grow in any soil not too damp, but in America it matures only in the extreme south.

Bermuda Hundred, Va., a peninsula formed by the junction of the Appomattox and James rivers, occupied by Gen. B. F. Butler, who, in 1864, commanded the Army of the James, numbering about 25,000 Federals, where he might intrench himself and await Grant's arrival. In the vicinity of this position there was constant fighting between Butler's troops and those of the Confederates under Gen. Beauregard, whose forces were 20,000 strong. The fighting continued from 16 May to 30 May. On the 16th Heckman's brigade was destroyed by the Confederates, who were then pushing on to Bermuda Hundred, when Ames and Gillmore came up and Beauregard's plans miscarried. On the 19th the Confederates assaulted the Federal rifle pits under Ames and Terry, but without success. Skirmishing continued until the 30th, when the Confederates desisted. Bermuda Hundred was a valuable position, since it was very near both Richmond and Petersburg; but Butler was charged with military incapacity in having "corked himself up in a bottle."

Bermudez, Remigio, Morales, bār-moo'-dāth, rā-mē'jē-ō mō-rā'lēz, Peruvian statesman: b. Tarapaca Province, 30 Sept. 1836; d. Lima, 31 March 1894. He began business in the nitrate trade in his native province. In 1854, as a lieutenant, he joined the revolutionary army which finally overthrew Gen. Echinique's

government. In 1864 he joined the revolution against President Castilla. In the war with Chile he led the force that marched to Arica. When Caceres was elected president in 1886, Bermudez was chosen vice-president, and was elected president in 1890.

Bermudez, bër-mū'dāth, Venezuela, a northeastern state situated between the Orinoco and the Caribbean Sea, formed in 1881 from the former states and present sections of Barcelona, Cumana, and Maturin. Area, 32,243 square miles; Pop. about 325,000.

Bern, bärn, or bërñ, Switzerland, the chief canton of the confederacy, situated in the western half and surrounded by the cantons of Neuchâtel, Freiburg, Vaud, Valais, Uri, Unterwalden, Lucerne, and Solothurn, being partly bounded also by France and Alsace; area, 2,657 square miles. The more northern portion of the canton has beautiful plains and valleys, and a fertile and highly cultivated soil, producing corn, wine, and fruits; the Emmenthäl, one of the richest and most fertile valleys in Switzerland, raises the finest cattle, and produces a celebrated cheese. The southern portion of the canton, the Bernese Oberland, begins at the foot of the high mountain chain between this canton and that of the Valais, and extends to its summit. The lower valleys produce good fruits, and are fertile and agreeable: higher up are excellent Alpine pastures; then succeed bare rocks, extensive glaciers (the source of magnificent streams and waterfalls), and some of the highest mountains of Switzerland, as the Finsteraarhorn, the Schreckhorn, and Wetterhorn, the Eiger, the Jungfrau. The chief trade of the canton is in linen and woolen manufactures, and cattle-raising. Pop. about 550,000.

After belonging to the Franks and Burgundians the Bernese territory became part of the German empire. In the long wars with Austria, Milan, Burgundy, and Savoy, the Confederacy came off victorious, and Bern conquered Aargau. In 1528 the citizens of Berne embraced the cause of the Reformation. In the subsequent war with the Duke of Savoy they conquered the Pays de Vaud. From that time till 1798 the prosperity and wealth of Bern constantly increased, so that the canton then contained above 5,000 square miles and about 380,000 inhabitants. On 5 March 1798, 30,000 French troops marched against Bern and conquered it, the result being that it now lost about half of its possessions; the northern part was united with the present canton of Aargau, and out of the southwestern (Pays de Vaud) the present canton of Vaud was formed. By the decrees of the Congress at Vienna, however, the greater part of the bishopric of Basel was joined to the canton. The present constitution dates from 1893 and is purely democratic. The legislative power is vested in a Great Council elected by the people voting in 62 electoral districts, there being one member for every 3,000 inhabitants. The executive is vested in a governing council of nine members elected by the Great Council, both being chosen for four years. The referendum is in force, and all laws may be submitted to popular vote before they become valid. The "initiative," or right to propose new measures, may be exercised by 12,000 voters acting together, but a demand for revision of the constitution must be supported by 15,000 voters.

BERN — BERNADOTTE

Bern, Switzerland, the capital of the canton of the same name (see above) and of the whole confederation; situated on an elevated rocky peninsula, washed on three sides by the Aar, which is crossed by several bridges, including the handsome Nydeck Bridge, the huge iron Kirchenfeld Bridge, and the Kornhaus Bridge (opened in 1898), with a roadway 160 feet above the Aar, and a principal arch of 380 feet span. The streets are, for the greater part, straight, wide, and well paved; and the houses, partly provided with piazzas, are substantially built of stone. The streets are purified by rills of water and adorned with fountains. Among the public buildings are the great Gothic cathedral 1421-1573; the Church of the Holy Spirit; the University; the hall of the Swiss Federal Council; the art museum, containing the municipal picture-gallery; a hospital; the town-house, a Gothic edifice of the 15th century, restored 1868; the mint, corn hall, historical and archaeological museum; the natural history museum; observatory; deaf-and-dumb institution; infirmary; orphan and lunatic asylums. The public library possesses great treasures of printed books and manuscripts. Trade and commerce are lively; the manufactures consist of woolens, cottons, silks, machinery, chocolate, etc. The city was founded in 1191, and in 1218 the German emperor Frederick II. declared it a free city of the empire and confirmed its privileges by a charter, which is still preserved. In 1353 it entered into the Helvetic Confederacy. In 1405 the greater part of the city was destroyed by fire, but it was afterward regularly rebuilt. The bear, as the heraldic emblem of Bern, figures frequently in a sculptured form; and a number of these animals in the flesh are kept at the cost of the municipality. There is a curious clock-tower containing mechanism by which the striking of the hours is heralded by the crowing of a cock and a procession of bears. Pop. (1909) 78,500.

Bern, University of, a state educational institution having its origin in a minor school which in the early part of the 16th century was much enlarged by the demand for accommodations for theological students. About 200 years later it expanded by the institution of departments of law, science, and medicine, and about 1830 was formally reorganized as a State university. It has a library of about 40,000 volumes and manuscripts, and educates about 1,300 students.

Bernacle Goose, a large goose of northern Europe and Greenland, allied to the brant, and named *Bernicla cucopsis*, a name identified with strange old fables. It differs from the brant mainly in its white cheeks, as the lavender-gray of the mantle. This goose is a common winter visitor to western Europe, retiring in summer to Arctic regions to breed, but the region and the character of its nesting remain undiscovered. Up to comparatively recent times it was the belief of the European peasants that this goose was born from the stalked barnacles which adhere to driftwood, and sometimes to the branches of trees that reach down into the sea at high tide. Circumstantial accounts were given of the birth of the young, whose tiny wings (the waving filaments of the feeding cirripeds) could be seen sticking out of the shells from which they were supposed to escape.

So firmly was this fixed in the minds of the people that it is given and illustrated with much detail as truth in many books of the time; and the Roman Church permitted these geese to be eaten on holy days because they were sea-born, and therefore "fish"! What is less generally known is that the cirripeds were named after the bird, as their supposed parent; and not the bird after the crustacean. Bernicle, like "brant," refers to the "burnt" black color of the birds, as explained in the 'English Dictionary' and by other authorities. The name has been adopted as generic for a large group of the geese usually distinguished by sportsmen as "brants" (q.v.).

Bernadotte, Jean Baptiste Jules, bär-nä-döt', zhôn báp-tést zhoöl, king of Sweden: b. Pau, 26 Jan. 1764; d. 8 March 1844. He was the son of an advocate of Pau, and enlisted in a French regiment of marines at the age of 17. He was made a subaltern in 1790, and thereafter his promotion was rapid. In 1794 he was appointed general of division, and distinguished himself greatly in the campaign in Germany and on the Rhine. After the battle of Neuwied he was introduced for the first time to Bonaparte, who conceived the highest opinion of his abilities, though a constant suspicion of Napoleon seems always to have been present in the mind of Bernadotte. In 1798 he married Mademoiselle Clary, sister-in-law of Joseph Bonaparte. The following year he became minister of war, but was shortly obliged to resign. On the establishment of the empire Bernadotte was created Marshal of France and Prince of Ponte-Corvo. At the head of an army of observation stationed in the north of Germany, he fixed his headquarters at Hamburg. At this time Gustavus IV. had been driven from the throne of Sweden. The Duke of Sudermania assumed the crown under the name of Charles XIII.; and as he was far advanced in years the diet had nominated, as his successor, the Prince of Holstein-Augustenburg, when the latter died in a mysterious manner. The heir-apparancy to the Swedish crown was then offered to the Prince of Ponte-Corvo. This offer was accepted by Bernadotte with the consent of the emperor; and in October 1810 he arrived in Sweden, where, having previously abjured the Roman Catholic religion, he was proclaimed heir-apparent to the throne under the title of Prince Charles John. He had not long been established in this dignity before serious disagreements took place between him and Bonaparte, whose blockade of the Continental ports was very detrimental to the commercial interests of Sweden. The result was a complete rupture, and the accession of Sweden in 1812 to the coalition of sovereigns formed against Napoleon. At the battle of Leipsic Prince Charles John contributed effectually to the victory of the allies. On the general re-establishment of the European dynasties at the termination of the war, strenuous but unsuccessful attempts were made by the emperor of Austria and other sovereigns to restore the family of Gustavus IV. to the crown; and Bernadotte, retaining his position as crown-prince, became king of Sweden on the death of Charles XIII. in 1818, under the title of Charles XIV. During his reign agriculture and commerce made great advances, and many important public works were completed; among others, the Götha Canal.

BERNADOU — BERNARD

He was succeeded by his son Oscar, father of the present sovereign, Oscar II.

Bernadou, John Baptiste, American naval officer: b. Pennsylvania, 1858. Educated at the Naval Academy in Annapolis, he entered the navy and in the Spanish-American war commanded the torpedo boat Winslow and was wounded in a naval engagement off Cardenas in May 1898. He has written 'The Development of the Resources of the United States for the Production of War Material'; 'The Development of Smokeless Powder'; 'A Trip Through Northern Korea in 1883-4.'

Bernard, bér'nard, bér-nârd', or (Fr.) **bâr-nâr, Saint(OF CLAIRVAUX)**, French ecclesiastic: b. Fontaine, Burgundy, 1091; d. 1153. In 1113 he became a monk at Cîteaux; in 1115 first abbot of Clairvaux, near Langres. An austere manner of living, solitary studies, an inspiring eloquence, boldness of language, and the reputation of a prophet, rendered him an oracle to all Christian Europe. He promoted the crusade of 1146, and quieted the fermentation caused at that time by a party of monks against the Jews in Germany. He declined all promotion, and in the rank of abbot of his "beloved Jerusalem" (as he used to call Clairvaux) he continued with all humility, but with great boldness, his censures of the clergy and his counsels to the Popes. Innocent II. owed to him the possession of the right of investiture in Germany, and Eugenius III. his education. He was, at the same time, the umpire of princes and bishops, and his voice in the synods was regarded as divine. By his rigid orthodoxy and his remarkable eloquence, which were always directed to the promotion of practical Christianity, he did much to confirm the power and influence of the Church in the Middle Ages. He was a strong opponent of Abelard and Gilbert of Porée in their philosophical teachings. He was canonized by Alexander III. in 1174. The best edition of his works is that of Mabillon (Paris 1690, 2 vols.; reprinted, Paris 1839-40).

Bernard, Saint, of Mentone: b. Mentone, Savoy, 923; d. Novara, May 1007. Very little is known of his life except that he was at one time archdeacon of the city of Aosta, and that he later entered upon a monastic life and founded the hospices on the Great and Little Mount Saint Bernard, about 962 A.D.

Bernard, bâ-nâr', Charles de, properly **Bernard du Grail de la Villette**, French novelist: b. Besançon, 25 Feb. 1804; d. Neuilly, 6 March 1850. He was a disciple of Balzac, whom he resembles in his power of realistic description and psychological analysis; but he possesses a purer and more nervous style, and above all is content with a less minute elaboration of story and characters. His first piece, 'The Gerfalcon,' made a hit with its clever description of the literary cliques. Everywhere he evinces clear insight into the foibles of society. Of his novels, the following may be named as only second in rank to his masterpiece, 'The Gerfalcon'; 'A Magistrate's Adventure'; 'The Gordian Knot'; 'Wings of Icarus'; 'The Lion's Skin'; 'The Country Gentleman.'

Bernard, bâr-nâr, Claude, French physiologist: b. Saint-Julien, department of the Rhône, 12 July 1813; d. Paris, 10 Feb. 1878. Educated

at Villefranche and Lyons, he went to Paris in order to devote himself to a literary career, but soon turned to medicine. In 1839 he became assistant to Magendie, who directed his attention to experimental physiology. He became professor at the Collège de France in 1855, and about the same time he was appointed to the chair of experimental physiology at the Sorbonne. In 1868 he resigned the latter chair in order to take up a similar one in the Museum of Natural History, and in that year also he was elected to Flourens' place in the Academy. He was one of the foremost physiologists of his age, and several important discoveries are associated with his name. Among his published works are 'Experimental Physiology Applied to Medicine' (1854-5); 'Physiology and the Pathology of the Nervous System' (1858); 'Physiological Properties and Pathological Alterations of the Liquids of the Organism' (1859); 'Properties of Living Tissues' (1866); 'Experimental Pathology' (1871); 'General Physiology' (1872); 'Animal Heat' (1876); 'Phenomena of Life Common to Animals and Vegetables' (1878-9); 'Experimental Science' (1878); etc. He was accorded a national funeral.

Bernard, bér'nard, Sir Francis, English administrator: b. Nettleham, England, 1714; d. Aylesbury, England, 16 June 1779. He was governor of New Jersey 1758-60, and of Massachusetts Bay 1760-9. He did a great deal toward precipitating the Revolution by his aggressive attempts to strengthen the royal authority. He was finally recalled on account of the unpopularity resultant on his bringing troops into Boston.

Bernard, Jacques, French Protestant clergyman and author: b. Nions, in Dauphiné, 1 Sept. 1658; d. 27 April 1718. When the Edict of Nantes was revoked, Bernard went to Holland, and while there founded a school of philosophy and belle-lettres at The Hague. He became editor of the 'Bibliothèque Universelle,' and later editor of the 'République des Lettres.' He wrote and published: 'Recueil de traites de paix, de trêves, de neutralité . . . et d'autres actes publics faits en Europe' (1700); 'Actes et mémoires des négociations de la paix de Ryswick' (1725); etc.

Bernard, Montague, English lawyer: b. Gloucestershire, 28 Jan. 1820; d. Overross, 2 Sept. 1882. He was professor of international law at Oxford 1859-74. In 1871 he was one of the high commissioners who signed the Treaty of Washington, and on his return home was made a privy counselor. In 1872 he assisted Sir Roundell Palmer in preparing the British case for the Geneva Arbitration Tribunal.

Bernard, Pierre Joseph, bâr-nâr, pê-âr zhô-sêf, or Gentil (zhôn-têl) Bernard, French poet: b. Grenoble, 1710; d. 1775. At an early age he showed a great taste for poesy, and was at first only an attorney's clerk, but afterward became secretary to Marshal de Coigny, who had command of the army of Italy. After the marshal's death he obtained a lucrative appointment, and was then able to indulge his poetic faculties. He wrote an opera, 'Castor and Pollux,' which met with great success; the 'Art of Loving,' and a number of odes, songs, etc. His works were collected and reprinted in 1803.

BERNARD — BERNARDAKIS

Bernard, Simon, bār-nār, sē-mōn, French engineer: b. Dole, 28 April 1779; d. 5 Nov. 1839. He served as aide-de-camp to Napoleon; was wounded at the battle of Leipsic; superintended the defense of Torgau, and was present at Waterloo. In 1816 he came to the United States; was commissioned brigadier-general of engineers; and planned an elaborate system of seacoast defences, the most important of the works built by him being Fortress Monroe. In 1831 he returned to France; was made aide-de-camp to Louis Philippe, and designed the fortifications of Paris. In 1834 he was appointed minister of war.

Bernard, bér-nard, William Bayle, Anglo-American dramatist: b. Boston, Mass., 27 Nov. 1807; d. 5 Aug. 1875. His first work was a nautical drama called 'The Pilot.' This proved successful and encouraged him to pursue a literary career. He wrote in all 114 plays, of which the best known are 'Rip Van Winkle'; 'The Man About Town'; 'Marie Ducange'; and 'The Boarding School.'

Bernard de Chartres, bār-nār dē shārtr (surnamed SYLVESTRIS), a writer of the 12th century, who has been lauded as the ablest Platonic of his time, and wrote two works, now lost, in one of which he endeavored to reconcile Plato and Aristotle, and in the other maintained the doctrine of a Providence, and proved that all material beings, possessing a nature subject to change, must necessarily perish. Another work under the name of Bernard Sylvestris still exists, and is composed of two parts, distinguished by the names of 'Megacosmus' and 'Microcosmus,' or the 'Great World' and the 'Little World.' He reduces all things to two elements — matter and ideas. Matter is in itself devoid of form, but susceptible of receiving it; ideas reside in the divine intellect, and are the models of life, and from their union with matter all things result. M. Cousin has published extracts from these works.

Bernard of Cluny, Benedictine monk: b. at Morlaix, about 1100; d. 1156. He was a member of the Benedictine monastery at Cluny under Peter the Venerable, and is best known as the author of three hymns included in almost every English collection: "Jerusalem the Golden"; "For Thee, O Dear, Dear Country"; and "The World is Very Evil." These are a part of his 3,000-line poem 'De Contemptu Mundi,' translated by J. M. Neale.

Bernard (bér-nard) of Treviso (trē-vē'zō), Italian alchemist: b. Padua, 1406; d. 1490. His most important work was 'Treatise on the Most Secret Chemical Labor of the Philosophers.'

Bernard de Ventadour, bār-nār dē vōn-tā-dōr, French troubadour: b. about 1125; d. Daulon, about 1197. Love songs 'To Eleonore,' and various amatory lays to courtly dames, form the riches of his delicate verse.

Bernard, bér-nard, Great St., a celebrated pass of the Pennine Alps, Switzerland, in the canton Valais, on the mountain-road leading from Martigny to Aosta in Piedmont. On the east side of the pass is Mount Velan, and on the west the Pointe de Dronaz; there is no mountain known by the name of St. Bernard. Almost on the very crest of the pass is the famous hospice, among the highest permanently inhabited spots in Europe, 8,200 feet above the level

of the sea. There is a massive stone building capable of accommodating 70 or 80 travelers with beds, and of sheltering 300. As many as 500 or 600 have received assistance in one day. It is situated on the highest point of the pass, exposed to tremendous storms from the northeast and southwest, and is tenanted by 10 or 12 brethren of the order of St. Augustine, who have devoted themselves by vow to the aid of travelers crossing the mountains. The climate of this high region is necessarily rigorous. There is a lake on the summit, at a short distance from the hospice, on which ice has frequently remained throughout the whole year. The severest cold recorded is -29° F., but it has often been -18° and -20° F.; the greatest summer heat recorded is 68° F. From the difficulty of respiration in so elevated a locality, and the severity of the climate, few of the monks survive the time of their vow, 15 years from the age of 18, when they are devoted to this service. The dogs kept at St. Bernard to assist the brethren in their humane labors are well known. In the midst of tempests and snowstorms the monks, accompanied by some of these dogs, set out for the purpose of tracking those who have lost their way. If they find the body of a traveler who has perished they carry it into the vault of the dead, where it is wrapped in linen and remains lying on a table till another victim occupies the place. It is then set up against the wall among the other dead bodies, which, on account of the cold, decay so slowly that they are often recognized by their friends after the lapse of years. Adjoining this vault is a kind of burying-ground, where the bones are deposited when they accumulate too much in the vault. It is impossible to bury them, because there is nothing around the hospice but naked rocks. The institution is supported partly by its own revenues, partly by subscriptions and donations. The pass appears to have been known at a very early period; and a Roman road led down the Piedmontese side of the mountains. The remains of a massive pavement are still visible; and the cabinet of the hospice contains votive tablets, bronze figures, and other antiquities found in the vicinity. The hospice was founded in 962 by St. Bernard of Menthon, an Italian ecclesiastic, for the benefit of those who performed pilgrimages to Rome. In May, 1800, Napoleon led an army of 30,000 men, with its artillery and cavalry, into Italy by this pass.

Bernard, Little St., a mountain of Italy, belonging to what are called the Graian Alps, about 10 miles south of Mont Blanc. It stands between Savoy and Piedmont, having the valley of the Isère, in the former, on the west, and that of the Doire, in the latter, on the east. The pass across it is one of the easiest in the Alps, and is supposed by many to be that which Hannibal used. The hospice, at the summit of the pass, has an elevation of 7,192 feet.

Bernardakis, Demetrios, bér-nār'dā-kīs, dā-mā'trē-ōs, Greek poet and dramatist: b. Santa Marina, Lesbos, 2 Dec. 1834. After a course of study at Athens and in German universities he was (with one considerable intermission) professor of history and philology in the University of Athens, 1861-82, when he went back to Lesbos. He is author of a spirited Pindaric ode for a jubilee occasion, of several dramas, and of a satire, 'The Battle of Cranes and Mice'; he

BERNARDES — BERNBURG

has also written a 'Universal History'; a 'Church History'; and a spirited tractate, 'Confutation of a False Atticism,' directed against the would-be Attic purists.

Bernardēs, Diego, bér-nār'dēs, dē-ā'gō, Portuguese poet: b. Ponte de Lima about 1530; d. 1605. He was called "the Sweet Singer of the Lima," a streamlet immortalized in his verse. He left his native valley in 1550 and attached himself to the master-singer, Sá de Miranda, who lived retired on his estate, Quinta da Tapada, a devotee of the Muses. Here Bernardes composed verses of all kinds — elegies, sonnets, odes, and songs, full of tender sympathies and perfect melody. Here he wrote 'The Lima'; 'Various Rimes — Flowers from Lima's Banks'; 'Various Rimes to the Good Jesu,' and other poems.

Bernardin of Sienna, Italian ecclesiastic: b. Massa, Italy, 8 Sept. 1380; d. Aquila, Abruzzo, 20 May 1444. He became a Franciscan friar in a monastery near Sienna in 1404, but, desiring to make a pilgrimage to the Holy Land, was appointed a commissary of that country, and was thus enabled to gratify his wish. After his return he acquired a great reputation as a preacher, and three cities were rival suitors for the honor of having him as bishop. Bernardin, however, was unwilling to accept the distinction, and was made vicar-general of the friars of the Observantine order in Italy. He is said to have founded more than 300 monasteries. In 1450 he was canonized by Pope Nicholas V. His works appeared at Venice in 1591 in 4 volumes quarto, and at Paris in 1636 in 2 volumes folio. They consist of essays on religious subjects, sermons, and a commentary on the book of Revelation. A biography by J. P. Toussaint was published (Regensburg 1873), and one by L. Bianchi (Sienna 1888).

Bernardines, bér-nār-dēnz. See CISTERCIANS.

Bernardo del Carpio, bér-nār'dō dēl kār'-pē-ō, Spanish knight-errant (the fruit of a secret marriage between Chimena, the sister of Alphonso the Chaste, and of Don Sancho, lord of Saldagua): b. in the 9th century. Alphonso, irritated at the marriage, put out the eyes of Don Sancho and imprisoned him in a castle, but spared Bernardo and brought him up carefully at his court. In course of time Don Bernardo grew up to be a warrior, and distinguished himself in the Moorish wars, in the hope that the king would be bent to pity and set his father at liberty. Alphonso was inflexible, and Bernardo withdrew to his paternal domains; and, leaguings with other lords opposed to the court, set him at defiance.

On the accession of Alphonso the Great, Bernardo returned to court, and again performed many exploits against the Moors, hoping to be rewarded with his father's freedom. He was once more denied the boon, and withdrew as before, not only leaguings with his friends, but making alliance with the Moors. Alphonso agreed at length to give up his father on receiving the surrender of the castle of Carpio. Bernardo, true to his word, performed his part of the stipulation, and then learned with indignation that Alphonso had practised an infamous deception upon him, as his father had been for some time dead. He disdained any longer to tread the Spanish soil, and removed to France, where he spent the remainder of his

life as a knight-errant. Many fabulous exploits have been attributed to him, both in Spanish romances and in more reliable histories.

Bernauer, bér-now-ēr, **Agnes**, Bavarian lady celebrated for her beauty and her unfortunate fate; d. 2 Oct. 1435. She was the daughter of a poor citizen, said to be a barber of Augsburg. Duke Albert of Bavaria, only son of the reigning prince, met Agnes at a tournament given in his honor by the grantees of Augsburg, became enamored of her, and, as he could not prevail on her to be his mistress, secretly married her. He conducted her to his own castle of Vohburg, and for a time succeeded in concealing the alliance he had contracted; but his father wishing to marry him to Anne, daughter of the Duke of Brunswick, he was compelled to acknowledge his marriage with Agnes. His father refused to credit it, and having caused the Duke to be denied admission to a tournament on the plea that he was living unlawfully with a woman, Albert openly proclaimed his marriage and caused Agnes to be recognized as Duchess of Bavaria, giving her for residence the castle of Straubing on the Danube. The Duke of Bavaria, incensed at this open avowal of a misalliance, caused Agnes to be seized in her castle during the absence of his son, brought her before a tribunal specially constituted, where she was accused of magic, and being condemned, had her hands tied together and was thrown into the river. Albert in revenge took arms against his father, but the Emperor Sigismund finally reconciled them. The Duke Ernest raised a chapel to the memory of Agnes, and Albert married the princess of Brunswick. Her story, though well authenticated, has become legendary from the interest attached to it, and is a favorite theme with the Bavarian poets.

Bernay, bār-nā, France, a town in the department of Eure, 25 miles west-northwest of Evreux, on the right bank of the Charentonne. It has two fine old churches, a communal college, a hospital, a court of first resort, a board of manufactures, an agricultural society, and a savings bank. It has important manufactures of cloth and flannel, tape, linen, and cotton goods; and spins a good deal of cotton, thread, and worsted. It has also bleachfields, dyeworks, tanneries, etc. Its trade is principally in grain, cider, cloth, iron, paper, leather, linen, horses, and cattle. The horse-fair, held in Lent, is one of the greatest in France, and is attended by purchasers from all parts of the country. Pop. about 6,000.

Bernburg, bérn-burh, Germany, a town in the duchy of Anhalt, capital of the former duchy of Anhalt-Bernburg; on both sides of the Saale, northwest from Leipsic, with which, as well as with Berlin and Magdeburg, it is connected by railway. It is divided into the old, the new, and the high town; the first two surrounded by walls, and communicating by a bridge 173 feet long. Bernburg is well built, and contains several well-paved and well-lighted streets. The principal building is the palace, situated, with a garden, on the highest part of the high town. It is very ancient, but has received numerous modern additions, and contains a picture-gallery, theatre, and church. Besides an oil-mill, and several breweries and distilleries, there are manufactories of paper and

earthenware, copper and tin wares etc. Pop. about 35,000.

Berne-Bellecour Étienne Prosper, *járnbél-koor, ä-të-ën prös-për*, French painter: b. Boulogne, 29 July 1838. After some years of study under Barras and Picot, he made a reputation by his spirited representations of episodes in the Franco-Prussian war of 1870. He received a first-class medal in the Paris Salon of 1872; the Legion of Honor in 1878; and a second-class medal at the Paris Exposition of 1889. His best known works are: 'Cannon Shot'; 'In the Trenches'; 'Attack on the Château'; and 'To Arms!'

Berners, John Bouchier, *boor'shë-ä*, Lord, English baron, a descendant of the Duke of Gloucester, youngest son of Edward III.: b. 1474; d. 1532. He was member of Parliament, 1495-1529; aided in suppressing the Cornish insurrection, 1497; chancellor of the exchequer, 1515; ambassador to Spain, 1518; and for many years governor of Calais. He translated 'Froissart's Chronicles' (1523-5) and other works, his translation of the former being a sort of English classic.

Berners, or Barnes, Juliana, English prioress and author: fl. 15th century. She was the daughter of Sir James Berners, who was beheaded in the reign of Richard II. Little more is known than that she was prioress of the nunnery of Sopewell, near St. Alban's, and has her name prefixed as writer or compiler to one of the earliest and most curious productions of the English press. The first edition, entitled 'The Treatyses Pertynynge to Hawkyng, Huntyng, and Fysshynge with an Angle' (of which only three perfect copies are known), printed in the abbey of St. Alban's in 1486, treats of hawking, hunting, and heraldry. A second edition was printed by Wynkyn de Worde in 1496. This work, under the title of the 'Book of St. Alban's,' became a popular manual of sporting science, and was many times reprinted in the 16th century. It has latterly been issued in facsimile of the original print.

Bernhard, bërnhärt, (DUKE OF WEIMAR), Dutch soldier (fourth son of Duke John of Saxe-Weimar): b. 6 Aug. 1604; d. 8 July 1639. He entered first the service of Holland, and afterward the Danish army employed in Holstein against the troops of the emperor, and commanded by the margrave of Baden-Durlach, and was present at the Conference of Lubeck, 1629, for negotiating peace. When Gustavus Adolphus entered Germany, Bernhard joined him, and was present at the attack upon Wallenstein's camp in the neighborhood of Nuremberg, 24 Aug. 1632. In the battle of Lützen, 6 Oct. 1632, he commanded the left wing of the Swedish army, avenged the death of Gustavus Adolphus, and although himself severely wounded, put the right wing of the imperial troops to flight. In 1633 he took Bamberg, Cronach, Höchstädt, and Aichstädt; but his attempt upon Ingolstadt miscarried. He also brought the cities of Ratisbon and Straubing into his power, and frustrated Wallenstein's intentions. The king of Sweden made him Duke of Franconia. His impetuosity caused the defeat at Nördlingen (q.v.), 24 Aug. 1634. He himself narrowly escaped being made prisoner. The prudence of Oxenstiern and the valor of Bernhard soon made amends for this fault. France, now entering

into a closer alliance with Sweden, concluded a separate treaty with Bernhard, who went to Paris, 16 Oct. 1634. Bernhard promised for 4,000,000 livres to raise an army of 18,000 men on the Rhine to act against Austria. He now carried on the war in the country adjacent to the Rhine, took the fortress of Zabern in Alsace, spread his army over Lorraine and Burgundy, and vanquished the forces of the emperor in several battles. At the commencement of the year 1638 he laid siege to Rheinfelden, not far from Basel. Here he was unexpectedly attacked in his camp, 18 February, by an Austrian army. Bernhard was obliged to retreat before superior numbers; but, having soon collected his forces, he surprised the Austrians, 21 February, and obtained a complete victory. Several Austrian generals were made prisoners, and the fortress of Rheinfelden was obliged to surrender, 13 May. He then undertook the siege of Breisach, the possession of which was necessary for maintaining himself in Alsace. An imperial army, under General Goetze, was defeated with great loss by Bernhard, 30 July. Bernhard captured several places of inferior importance during the siege of Breisach, which, however, did not surrender until he had repeatedly defeated the Austrians, and then upon very moderate conditions, which Bernhard signed in his own name without mentioning France. The possession of Alsace, which he had before ceded to France under certain conditions, was now secured; but he also demanded Breisach as an appurtenance to Alsace. He garrisoned all the conquered places with German troops, and ordered money to be coined with the Saxon coat of arms and that of Breisach. In vain were the efforts of France to deprive the duke of the possession of Breisach by proposing to place a French garrison in the fortress; the Duke declined not only this proposal, but also an invitation to Paris and the offer of a marriage with the Duchesse d'Aiguillon, niece of Cardinal Richelieu. Instead of that match he proposed one with the princess of Rohan, to which, however, the French court would not accede, lest the party of the Huguenots should be strengthened. It is probable that Richelieu had recourse to poison in order to rid France of the Duke, who was becoming formidable by his growing power. Immediately after his death several French commissioners appeared, who enlisted his troops into the French army; the command of them was committed to Marshal Guébriant. With Bernhard fell one of the chief supports of the Protestants. His successors, Banér and Torstenson, pursued his victorious course, and France seriously exerted herself in the war which continued for the benefit of the Protestants. In Bernhard a graceful person, intelligence, and valor were united with a magnanimity which could not be shaken by adverse events; his only fault was too great impetuosity.

Bernhardi, August Friedrich, *bërnhär'dë, ow'goost frë'drîh*, German scholar: b. Berlin, 1768; d. there, 1820. In his youth his attention was directed to universal language (that is, to language as far as it is common to all rational beings), to the mystery of its construction—the mathematics, as it were, of language. Bernhardi, considering all different languages as a whole, endeavored to discover a universal grammar common to them all. The result of his researches appears in his works:

BERNHARDI — BERNIER

'Abstract Grammar' (2 vols. 1801); 'Grammar in Its Application' (1803); and 'Elements of the Science of Language,' in which many philosophical principles of language are laid down. Bernhardt was a man of cultivated mind and extensive knowledge. He was also a professor and director of a classical school in Berlin.

Bernhardt, Theodor von, tā'o-dōr fōn, German historian and diplomat: b. Berlin, 6 Nov. 1802; d. Kunersdorf, Silesia, 12 Feb. 1887. His diplomatic career was important, and afforded him special facilities for compiling a 'History of Russia and of European Politics During the Years 1814-31' (1863-77); 'Friedrich the Great as a Military Commander' (1881); and similar works, all of value.

Bernhardt, Rosine, bār-n'härt, rō-zēn, better known as SARAH, French actress: b. Paris, 22 Oct. 1844. Of Jewish descent, her father French, her mother Dutch, her early life was spent largely in Amsterdam. In 1858 she entered the Paris Conservatoire and gained prizes for tragedy and comedy in 1861 and 1862; but her début at the Théâtre Français in 'Iphigénie' and Scribe's 'Valérie' was not a success. After a brief retirement she reappeared at the Gymnase and the Porte Saint-Martin in burlesque, and in 1867 at the Odéon in higher drama. Her success in Hugo's 'Ruy Blas' in 1872 led to her being recalled to the Théâtre Français, since which she has abundantly proved her dramatic genius. In 1879 she visited London, and again in 1880, about which time she severed connection with the Comédie Française under heavy penalty. In 1880, 1887, 1891, 1896, and 1900 she made successful appearances in the United States, and between and after these dates visited Switzerland, Holland, South America, Italy, Algeria, Australia, etc. In 1899 she appeared in a new rendering of 'Hamlet' in Paris, and scored a most flattering triumph. Among her most successful impersonations are 'Théodora,' 'Fédora,' 'La Tosca,' and 'Cléopâtre' in the plays bearing those titles. In 1882 she married M. Damala, a Greek, whom she divorced not long afterward. She is also known as a sculptor, painter, and playwright.

Bernhardy, Gottfried, bērn'hār-dē, gōt'frēd, German classical philologist: b. Landsberg-on-the-Warthe, 20 March 1800; d. Halle, 14 May 1875. He lectured very brilliantly at the leading universities, his principal works being 'Greek Syntax Scientifically Considered' (1829), a historical study of the subject; 'Outlines of Roman Literature' (5th ed. 1872); 'Outlines of Greek Literature' (Part I. 5th ed. 1892; Part II. 2d-3d ed. 1876-80; Part III. wanting), and a supplement to the first-named treatise, entitled 'Paralipomena [Omission] in [the Work on] Greek Syntax' (1854-62); although he has written many other important books.

Berni, Berna, or Bernia, Francesco, bērn'ē, bērn'ā, or bērn'ē-a, frān-ches'kō, Italian poet: b. Lamporecchio, Tuscany, toward the close of the 15th century; d. 26 July 1536. His family was noble, but poor, and young Berni went to Florence, and at the age of 19 to Rome, where he lived under the care of his relation, Cardinal Bibiena. At length he entered the service of Ghiberti, bishop of Verona, datary of the papal chancery, as secretary. In the hope

of promotion he took orders; but sought recreation in amusements which displeased the prelate. A society had been established at Rome, consisting of young ecclesiastics of a jovial temper like Berni, and of a poetical vein, who, in order to denote their love for wine and their careless gaiety, called themselves *i vignajuoli* (vine-dressers). They laughed at everything, and made sport in verse of the most serious, nay, the most tragic matters. Berni's verses were the most successful, and were written in so peculiar a style that his name has been given to it (*maniera Bernesca* or *Bernesca*). When Rome was sacked by the troops of the Constable Bourbon, 1527, Berni lost all that he possessed. He afterward made several journeys, with his patron Ghiberti, to Verona, Venice, and Padua. At length, wearied with serving, and satisfied with a canonship in the cathedral at Florence, he retired to that place. The favor of the great, however, which he was weak enough to court, brought him into difficulties. He was required to commit a crime, and his refusal cost him his life. Alessandro de' Medici, at that time Duke of Florence, lived in open enmity with the young Cardinal Ippolito de' Medici. Berni was so intimate with both that it is doubtful which first made him the proposal to poison the other. Certain it is that the cardinal died by poison in 1535, and it is probable that Alessandro caused Berni's death.

In the burlesque style of poetry, Berni is still considered the best model. His satire is often very bitter, and frequently unites the good humor of Horace with the causticity of Juvenal. The extreme licentiousness of his writings is his greatest fault. Berni also wrote Latin verses very correctly, and was well acquainted with Greek. His 'Burlesque Verses' have great merit; so also has his *rifacimento* of Bojardo's 'Orlando Innamorato.'

Bernicia, bērn'ish'ya, a Latinized form of the English word Brynclach, used to indicate the north part of what became the kingdom of Northumbria, the part north of the river Tees. The Anglian kingdom of Bernicia is said to have been founded by Ida, who made his capital at Bamborough about 550 A.D.

Bernier, bērn-nyā, Camille, French painter: b. 1823. He did not exhibit until 1863, but in a few years became one of the leading landscape artists of France, a position he has held for 40 years. His best-known works are: 'The Abandoned Lane'; 'Evening'; 'A Farm in Brittany'; and 'Landes, Near Bannalec.'

Bernier, François, French physician and traveler: b. Angers, about 1625; d. Paris, 1688. He set out on his travels in 1654, and after visiting Egypt and Palestine, went into India, where his skill in medicine brought him into notice; and he remained for 12 years, residing chiefly at Delhi, as physician to the Great Mogul Emperor Aurungzebe. On one occasion he accompanied the prime minister on his march, at the head of an immense army, to the conquest of Cashmere, and in his travels, recording all that he saw, has given accounts full of interest, and recognized by subsequent travelers as remarkable for their fidelity. After his return to France he not only compiled his 'Travels' and several volumes of history relating to the empire of the Great Mogul, but turned his attention to philosophical subjects, and published

BERNINA — BERNOUILLI

an abridgment of the philosophy of Gassendi. He also wrote a treatise, entitled 'Traité du Libre et du Volontaire.'

Bernina, bër-nē'na, a mountain of the Rhætian Alps, 13,290 feet high, in the Swiss canton of Grisons, with remarkable and extensive glaciers. Its summit was first attained in 1850. The Bernina Pass, which attains an elevation of 7,642 feet, and over which a carriage road was completed in 1864, leads from Pontresina to Poschiavo.

Bernini, Giovanni Lorenzo, bër-nē'ne, jō-vān'ne lō-rēn'zō, called IL CAVALIERE BERNINI, Italian sculptor and architect: b. Naples, 7 Dec. 1598; d. Rome, 28 Nov. 1680. Richly endowed by nature and favored by circumstances, he rose superior to the rules of art, creating for himself an easy manner, the faults of which he knew how to disguise by its brilliancy. From his early youth he manifested a great power to excel in the arts of design, and one of his first works was the marble bust of the prelate Montajo. He was not yet 18 when he produced the 'Apollo and Daphne,' in marble, a masterpiece of grace and execution. Looking at this group near the close of his life, he declared that he had made very little progress since the time when that was produced. Without forsaking sculpture, Bernini's genius embraced architecture, and he furnished the design for the canopy and the pulpit of St. Peter's, as well as for the circular place before the church. Among his numerous works were the palace Barberini, the belfry of St. Peter's, the model of the monument of the Countess Matilda, and the monument of Urban VIII., his benefactor. Urban had scarcely closed his eyes, and Innocent X. ascended the papal throne, when the envy engendered by the merits of the artist and the favor bestowed on him broke forth. His enemies triumphed; but he regained the favor of the Pope by a model for a fountain. About the same time he erected the palace of Monte Citorio. Alexander VII., the successor of Innocent X., required of him a plan for the embellishment of the Piazza di San Pietro. The admirable colonnade, so beautifully proportioned to the Basilica, was built under the direction of Bernini. We may also mention the palace Odescalchi, the Rotunda della Riccia, and the house for novices, belonging to the Jesuits, on Monte Cavallo. Louis XIV. having invited him to Paris, he set out from Rome, in 1665, accompanied by one of his sons and a numerous retinue. Never did an artist travel with so great pomp and under such flattering circumstances. The reception which he met with in Paris was highly honorable. He was first occupied in preparing plans for the restoration of the Louvre, which, however, were never executed. Cardinal Rospigliosi having become Pope, Bernini was admitted to an intimate intercourse with him, and charged with several works; among others, with the decoration of the bridge of St. Angelo. In his 70th year this indefatigable artist executed one of his most beautiful works, the tomb of Alexander VII. He was buried with great magnificence in the church of St. Maria Maggiore. To his children he left a fortune amounting to about 3,300,000 francs. Bernini's favorite maxim was, *Chi non esce talvolta della regola, non passa mai*. Thus he was of opinion that,

in order to excel in the arts, one must rise above all rules, and create a manner peculiar to one's self.

Bernis, François Joachim de Pierres de, bār-nes, frōn-swā jō-ā-kēm dē pē-ār dē, French cardinal and minister of Louis XV.: b. St. Marcel, de l'Ardeche, 1715; d. Rome, 2 Nov. 1794. Madame de Pompadour presented him to Louis XV., who, being pleased with him, assigned to him an apartment in the Tuileries, with a pension of 1,500 livres. He went as ambassador to Venice, and after his return enjoyed the highest favor at court, and soon became minister of foreign affairs. The political system of Europe was changed at that time. France and Austria, hitherto enemies, united in an offensive and defensive alliance, which was succeeded by the Seven Years' war, so unfortunate for France. Bernis has been designated by several writers as the chief author of this alliance. Duclos, however, asserts that it was the intention of Bernis to maintain the old system, which, since the time of Henry IV., and especially since the time of Richelieu, had made France the protectress of the less powerful states of Germany, and the rival of Austria. Oppressed by the misfortunes of his country, which, in part at least, were ascribed to him, Bernis surrendered his post, and was soon after banished from court. His disgrace lasted till the year 1764, when the king appointed him Archbishop of Albi, and, five years later, ambassador to Rome. Here he remained till his death. In the name of his court, and against his own opinion, he labored to effect the abolition of the order of the Jesuits. When the aunts of Louis XVI. left France in 1791 they fled to him for refuge, and lived in his house. The Revolution deprived him of his fortune, and the means of indulging his generous disposition. The easy poetry of youth had procured him a place in the French Academy, but he himself is its severest critic. Voltaire had a great esteem for his talents, his judgment, his criticisms, and his character, as is evident from their correspondence, which, in every other respect, is very honorable to Bernis. A collection of Bernis' works was published in 1797 by Didot, and another in 1825.

Bernissartia, an extinct genus of primitive crocodiles (*Mesosuchia*) of lower Cretaceous (Wealden) age. It resembles the modern crocodiles in the arrangement of the bony plates on the back more nearly than do other contemporary species, but was of quite small size, only three or four feet in length. A complete skeleton was found at Bernissart, in Belgium, and is now mounted in the Brussels Museum.

Bernouilli, bār-noo-ye, or **Bernoulli**, a family which has produced eight distinguished men, who have all cultivated the mathematical sciences with success. The family, emigrated from Antwerp on account of religious persecutions, under the administration of the Duke of Alva, fled first to Frankfurt, and afterward removed to Bâle, where it was elevated to the highest dignities of the republic.

Bernouilli, Daniel, Swiss philosopher: b. Groningen, 9 Feb. 1700. He studied medicine, in which he took the doctor's degree, and at the age of 24 was offered the presidency of an academy about to be established at Genoa, but in the following year accepted an invitation to St. Petersburg. Accompanied by his younger brother

BERNOUILLI — BEROE

John, he returned to Bâle in 1733; became there professor of anatomy and botany; in 1750 professor of natural philosophy; resigned this place, because of his advanced age, to his brother's son, the younger Daniel Bernouilli, in 1777, and died in 1782. He was one of the greatest natural philosophers as well as mathematicians of his time. At 10 different times he received a prize from the Academy of Paris. In 1734 he shared with his father a double prize, given by this academy for their joint essay on the causes of the different inclinations of the planetary orbits. Most of his writings are contained in the Transactions of the St. Petersburg, Paris, and Berlin academies, of which he was a member.

Bernouilli, Jakob, or **James**, Swiss mathematician: b. Bâle, 1654; d. 1705. The differential calculus discovered by Leibnitz and Newton was applied by him to the most difficult questions of geometry and mechanics; he calculated the loxodromic and catenary curve, the logarithmic spirals, the evolutes of several curved lines, and discovered the "numbers of Bernouilli," as they are called.

Bernouilli, Johann, Swiss mathematician: b. Bâle, 1667; d. 1 Jan. 1748. He was one of the greatest mathematicians of his time, and the worthy rival of Newton and Leibnitz. He was destined for commerce, but his inclination led him to the sciences, and from the year 1683 he principally devoted himself to medicine and mathematics. To him and his brother James we are indebted for an excellent treatise on the differential calculus. He also developed the method of proceeding from infinitely small numbers to the finite, of which the former are the elements or differences, and called this method the *integral calculus*. In 1690-2, he made a journey to France, where he instructed the Marquis de l'Hôpital in mathematics. At this time he discovered the exponential calculus, before Leibnitz had made any communications respecting it, and made it known in 1697. In 1694 he became doctor of medicine at Bâle, and in 1695 went, as professor of mathematics, to Groningen, where he discovered the mercurial phosphorus or luminous barometer, for which he received, from King Frederick I. of Prussia, a gold medal, and was made a member of the academy in Berlin, afterward of that in Paris. After the death of his brother in 1705, he received the professorship of mathematics at Bâle, which he held until his death.

Bernouilli, Nicolas, nephew of Johann Bernouilli, Swiss mathematician: b. Bâle, 1687; d. 1759. He studied law, but more particularly devoted himself to mathematics; in 1705 went to Groningen to Johann Bernouilli; returned however with him to Bâle toward the close of the year, and became there professor of mathematics. He traveled through Switzerland, France, Holland, and England, and in 1713 became a member of the Academies of Science in London and Berlin. On the recommendation of Leibnitz he went as professor of mathematics to Padua in 1716, but returned to his native city in 1722 as professor of logic. In 1731 he became professor of the Roman and feudal law in that place.

Bernouilli, Nicolas, Swiss jurist, son of Johann Bernouilli: b. Basel, 1695; d. St. Pe-

tersburg, 1726. He was professor of jurisprudence at Bern and subsequently professor of mathematics at St. Petersburg.

Bernstein, bérn'stín, Aaron, German publicist and novelist: b. Dantzic, 1812; d. 1884. He was in politics a Radical, and in religion a reformer, and his life was a continued battle against obscurantism and conservatism. Yet he wrote some charming stories of life among the Jews, among them 'Mendel Gibbor' (1860). He wrote also some notable historical sketches, as 'The People's Years' and 'The Years of Reaction.'

Bernstein, Eduard, leader of the German social democracy: b. Berlin, 6 Jan. 1850. As a young man he edited socialistic newspapers in Berlin until the vehemence of his opposition to the government of Bismarck made it desirable for him to leave Germany. Returning in 1901, he became editor of *Vorwärts*. He contends that every movement for the advancement of the people should be encouraged and taken advantage of by the common people, whom he urges to take an active part in politics. Besides his newspaper work, he has published several volumes of discussions on politico-economical subjects, such as 'Zur Geschichte und Theorie des Sozialismus' (1900).

Bernstorff, Andreas Peter, bérn'störf, ändrâ-as pä'tér (COUNT), Danish statesman: b. 1735; d. 1797. He was appointed prime minister in 1769, when he ceded to Russia the Gottorp part of Holstein in exchange for Oldenburg and Delmenhorst. He introduced a new system of finance, and prepared the abolition of villanage in Schleswig and Holstein. He was a pronounced Liberal, and contended for the freedom of the press.

Bernstorff, Johann Hartwig Ernst (COUNT), Danish statesman in the service of the king of Denmark: b. Hanover, 1712; d. 1772. He was employed in divers embassies, and afterward held the office of foreign minister to Frederick V. for about 20 years, resigning in 1770. He was called by Frederick the Great "the oracle of Denmark."

Beroaldo, bâ-rô-âl'dô, Filippo, Italian scholar: b. Bologna, 1453; d. 1505. He early gave proofs of great abilities and a prodigious memory, and after completing his education opened a school, successively at Bologna, Parma, and Milan, and taught with great success. He afterward went to Paris, and gave lectures which greatly extended his fame. His townsmen now became desirous to possess him, and he returned to Bologna, where he spent the remainder of his life as professor of belles-lettres. He is now chiefly known as the editor of some good editions of the classics, and the author of a curious tract entitled 'Declamatio Ebriosi, Scortatoris et Aleatoris,' in which the drunkard, rake, and gambler, represented as three brothers, debate which of them, as being the most vicious, should be excluded from sharing in his father's inheritance.

Bero'e, daughter of Oceanus; also the name of several women connected with Thrace, Illyria, etc.; also a genus of animals, the typical one of the family *Beroidæ*. The beroes are oval or globular-ribbed animals, transparent and gelatinous, with cirri from pole to pole, and two long tentacles fringed with cirri, which aid them in breathing and in locomotion. They have a

mouth, a stomach, and an anal aperture. They are free swimming organisms inhabiting the sea, sometimes rotating, and at night phosphorescent.

Bero'sus, according to some a Chaldaean by birth, and a priest of the temple at Belus at Babylon, and according to others a contemporary of Alexander the Great, is celebrated both as a historian and an astronomer, though it has been alleged that his name merely has been used for the purpose of giving a reputation to what others had written. His history, giving an account of the Babylonian Chaldaeans and their kings, consisted of two books written in Greek, and professed to be founded on the ancient archives of the temple of Belus. It exists only in fragments, contained in the writings of Josephus, Eusebius, and others, and given in a collected form by Richter (1825). According to Pliny the astronomical observations contained in the works of Berosus extended over a period of 480 years.

Berquin, Arnaud, bër-kăn, är-nô, French writer: b. Bordeaux, 1749; d. 1791. He first attracted notice by some poems which he entitled 'Idylles,' and by several translations from the English under the name of 'Tableaux Anglais,' but is best known by his work entitled 'Ami des Enfants,' for which he received the prize of the French Academy in 1789, as the most useful work which made its appearance during that year. It has been translated into most European languages, and still continues a standard work for the amusement and instruction of young people. It cannot, however, lay claim to the merit of originality, as both the title and much of the substance are derived from a work in German by Weiss, entitled 'Kinderfreund.' Berquin, though specially devoted to the instruction of youth, was not incapable of excelling in graver literature, and was for some time the editor of the *Moniteur*.

Berquin, ber-kañ', Louis de, the first Protestant martyr in France: b. 1490; d. Paris, 17 April 1529. He was a gentleman of Artois, a friend of Badius, the savant. When, in 1523, the police began to seize Luther's works, with a view to suppressing Protestantism, they found among Berquin's books some manuscripts of his own writing that were pronounced heretical. As he refused to retract, he was thrown into prison. Francis I., whose counselor he was, obtained for him his freedom; and Erasmus, always his friend, tried in vain to prevent him from exposing his life in a useless struggle. His fixed opinions and intrepid nature, however, having thrown him into prison three times, caused him to be condemned to death, and he was burned alive.

Berredo e Castro, bär-rä'dô ē kăsh'trô, Portuguese soldier and historian: b. Serpa, about 1680; d. Lisbon, 13 March 1748. Having entered the army he fought at the battle of Saragossa (1710), so distinguishing himself on that occasion that he was made governor-general of the province of Maranhão, Brazil, and in 1718 he became captain-general of Mazagao. The rest of his life was spent upon his history which is of great value as an original source of information for the period of which it treats. It is entitled 'Annals Historicos, do estado do Maranhão' (1749).

Berret'ta. See BIRETTA.

Ber'rian, William, American Episcopal clergyman and writer: b. New York, 1787; d. 7 Nov. 1862. He was rector of Trinity Church, New York, 1830-62. Besides various religious works, he wrote 'Travels in France and Italy' and a 'Historical Sketch of Trinity Church.'

Ber'rien, John Macpherson, American lawyer and politician: b. New Jersey, 23 Aug. 1781; d. Savannah, Ga., 1 Jan. 1856. He was the son of an officer in the war of the American Revolution, graduated at Princeton in 1796, was admitted to the bar of Georgia at the age of 18, and gradually rose in reputation till he was elected, in 1809, solicitor of the eastern district of Georgia. He became judge of the same district the next year, retaining the latter office till 1822, when he entered the Georgia Senate, from which he was transferred, in 1824, to the Senate of the United States. He established in that body a high reputation as an orator and statesman, was appointed attorney-general of the United States in 1829, resigned this office in 1831 when Gen. Jackson's cabinet became inharmonious, resumed the practice of his profession in Savannah till 1840, when he was elected again to the national Senate, and was re-elected in 1846.

Berro, Bernardo Prudencio, bār'rô, bér-nār'dô prû-dên'cê-o, Uruguayan statesman: b. Montevideo, about 1800; d. April 1868. In 1852 he was vice-president and president of the senate. Under Giro he was minister of government till the revolution of 1853; again president of the Senate in 1858, and president of the republic in 1860-4. The revolution of Flores was successful soon after the expiration of his term. In 1868 he stirred up a revolt against Flores, was imprisoned, and soon afterward shot through a window in his cell.

Berruguete, bër-roo-gă'te, Alonzo, Spanish painter, architect, and sculptor: b. Paredes de Nava, Spain, 1480; d. Toledo, 1561. He went in early life to Italy, studied in the school of Michael Angelo, and became intimate with Andrea del Sarto, Baccio Bandinelli, and other celebrated artists. On his return he was appointed painter to Charles V. His principal architectural works are the royal palace at Granada, and the town-house of Seville; his skill as a sculptor is seen to great advantage in the choir of the cathedral of Toledo, and the tomb of the vice-chancellor of Aragon at Saragossa. His best paintings are at Valladolid, Toledo, and Salamanca.

Berry, bă-rē, Carolina Ferdinanda Louisa, Duchesse de, widow of the second son of Charles X. of France; daughter of Ferdinand I. of the Two Sicilies: b. 5 Nov. 1798; d. 17 April 1870. Her futile attempt at insurrection in 1832, to place her son on the French throne, caused her imprisonment and subsequent withdrawal to Sicily.

Berry, Charles Ferdinand, Duc de, second son of the Count d'Artois (afterward Charles X.) and Maria Theresa of Savoy: b. Versailles, 24 Jan. 1778; d. 14 Feb. 1820. He was educated along with his elder brother, the Duke of Angoulême. In 1792 he fled with his father to Turin, served under him and Condé on the Rhine, and early learned the art of winning the love of the soldiers. Subsequently he lived alternately in London and Scotland, continually occupied with plans for the restoration of the

BERRY — BERSIER

Bourbons. Landing at Cherbourg, 13 April 1814, he passed through the cities of Bayeux, Caen, Rouen, etc., gaining over the soldiers to the cause of the Bourbons, distributing alms, and delivering prisoners. When Napoleon landed from Elba, the king committed to Berry the chief command of all the troops in and around Paris. All his efforts to secure their fidelity proving ineffectual, he was obliged to retreat on the night of 10 March, with the troops of the household to Ghent and Alost, where the king then was. The battle of Waterloo enabled him to return to Paris, where he arrived 8 July, and surrendered his command over the troops of the household into the hands of the king. At the opening of the chambers in Paris he took the oath to maintain the constitution, and was appointed president of the fourth bureau; but soon retired from public life. He died of a blow inflicted by a political fanatic named Louvel (see LOUVEL). The duke left a daughter, Louise Marie Thérèse, afterward Duchess of Parma; and a posthumous son, subsequently known as Count de Chambord.

Berry, Hiram George, American soldier: b. Rockland, Me., 27 Aug. 1824; d. Chancellorsville 2 May 1863. He entered the Union army as colonel of the 4th Maine infantry, and was present at the battle of Bull Run, the siege of Yorktown, took a conspicuous part in the battles of Williamsburg, Fair Oaks, Chantilly, and the second Bull Run campaign. President Lincoln nominated him a major-general of volunteers, January 1863, and he succeeded Gen. Sickles in command of the 2d division of the 3d army corp. At a critical point in the battle of Chancellorsville, 1 May 1863, Hooker ordered Gen. Berry to charge with the bayonet the advancing enemy. He did so, and for three hours his division, almost alone withstood the enemy's assault, and regained for the Federal forces a portion of their lost ground. He was killed at the head of a successful bayonet charge, upon the renewal of the battle the following day.

Berry, Mary, English author: b. Kirkbridge, Yorkshire, 16 March 1763; d. London, 20 Nov. 1852. She and her sister Agnes were intimate friends of Horace Walpole. In 1798 she edited the 'Works of Horace Walpole.' Her most ambitious work was her 'Social Life in England and France' (1844).

Berry, or Berri, a former province and dukedom of France, of which Bourges was the capital. With the exception of the arrondissement St. Amand, which belonged to the Bourbonnais, it now forms the departments Indre and Cher. At several periods it gave a title to French princes, the younger son of Charles X. being the last to assume it.

Berry, Canal de, one of the most important canals in France as regards the amount of its traffic. It begins at Montluçon on the Cher, the chief trading centre of the coal fields of the Allier; descends the Cher valley to St. Amand, and ultimately enters the Cher itself near St. Aignan, below which point the canalized Cher continues the line of navigation to Tours. Length of navigation 200 miles, of which 36½ miles belong to the canalized Cher. Constructed 1807-41.

Berry, a succulent fruit in which the seeds are immersed in a pulpy mass enclosed in a thin

skin; for example, grape, gooseberry, tomato. Popularly the term is applied to fruits not strictly berries; for example, strawberry, raspberry, etc., which bear external seeds on a pulpy receptacle.

Berryer, bār-yā, Antoine Pierre, French advocate and orator: b. Paris, 4 Jan. 1790; d. 29 Nov. 1868. In 1814 he proclaimed at Rennes the deposition of Napoleon, and remained till his death an avowed Legitimist. He assisted his father in the defense of Ney, secured the acquittal of Gen. Cambronne, and defended Lamennais from a charge of atheism. His eloquence was compared with that of Mirabeau, and after the dethronement of Charles X. (1830) he remained in the chamber as the sole Legitimist orator. In 1840 he was one of the counsel for the defense of Louis Napoleon after the Boulogne fiasco. In 1843 he did homage to the Count de Chambord in London, adhering to him through the revolution of 1848, and voting for the deposition of the prince-president the morning after the *coup d'état*. He gained additional reputation in 1858 by his defense of Montalembert, and was counsel for the Patterson-Bonapartes in the suit for the recognition of the Baltimore marriage. In 1863 he was re-elected to the chamber with Thiers, and in 1864 received a flattering reception in England.

Bersaglieri, bër-sā-lyā're, a corps of riflemen or sharpshooters, introduced into the Sardinian army by Gen. Della Marmora, about 1849. They took part in the Russian war and also assisted at the battle of the Tchernaya, 16 Aug. 1855. They were likewise employed in the Italian wars of 1859 and 1866. Their strength comprised 12 regiments, each regiment composed of three battalions of four companies each.

Ber'serker, a descendant of the eight-handed Starkader and the beautiful Alfhilde, and according to the Scandinavian mythology, a famous warrior. He disdained the protection of armor, whence he received his name, which signifies, according to Ihre, armorless. He raged like a madman in battle. He killed King Swafurlam, and married his daughter, by whom he had 12 sons as untamable as himself. They were also called Berserker, and after their time the name was given to wild and fierce Scandinavian warriors.

Bersezio, ber-sets'yō, Vittorio, Italian novelist and playwright: b. Peveragno, Piedmont, 1830. Both as a writer of tales and of comedies he is conspicuous for vivid and faithful delineation of Piedmontese life; especially in his dialect comedies, among which 'The Misfortunes of Monssù Travett' is considered to be his masterpiece. He also wrote an excellent historical work, 'The Reign of Victor Emmanuel II.' (1878-93).

Bersier, bār-syā, Eugène Arthur François, a French Protestant pulpit orator of note: b. Morges, near Geneva, 1831; d. Paris, 19 Nov. 1889. He became in 1855 a preacher in Paris where he was much admired and his sermons were translated into several languages. Among his writings are 'Coligny avant les guerres de religion' (1884); 'Histoire d'une petite fille heuveuse' (1890); in English, 'Sermons' (1881-1901). See Tinling, 'An Analysis of the Published Sermons of Pastor Eugène Bersier' (1901).

BERT — BERTHOLLET

Bert, bār, Paul, French statesman and physiologist: b. Auxerre, 17 Oct. 1833; d. Ketcho, Tonquin, 11 Nov. 1886. He studied both law and medicine, became assistant to Claude Bernard at the College of France, and successively occupied the chairs of physiology at Bordeaux and Paris. Entering political life in 1870, on the proclamation of the republic, he was four times re-elected to the chamber. He brought forward laws removing primary instruction from the control of the religious orders, and making it compulsory. During the premiership of Gambetta he held the post of minister of public instruction and worship. While engaged in public life, M. Bert still pursued with ardor his scientific investigations, attracting world-wide attention by his experiments in vivisection. The anti-religious views of M. Bert excited much controversy. He was also the author of several works on anatomy and physiology, and of numerous educational and political writings. He rendered a service to natural science by the clear and simple style of his text-books.

Berthelot, bār-tlō, Pierre Eugene Marcelin, French chemist: b. Paris, 25 Oct. 1827; d. there 18 March 1907. He early studied chemistry, and in 1859 was appointed professor of organic chemistry in the Superior School of Pharmacy. In 1865 a new chair of organic chemistry was organized for him in the College of France. In 1870 he was elected president of the scientific committee of defense, and during the siege of Paris was entrusted with the manufacture of ammunition and guns, and especially dynamite and nitro-glycerine. In 1878 he became president of the committee on explosives, which introduced smokeless powder. His labors also led to the discovery of dyes extracted from coal tar. He received the decoration of the Legion of Honor in 1861; was made commander in 1879, and grand officer in 1886. In 1889 he was elected permanent secretary of the Academy of Sciences. He has contributed to the knowledge of synthetical processes and to the relations between the phenomena of heat and of chemistry. His works include: 'Chimie organique fondée sur la synthèse' (1860); 'Leçons sur les principes sucrés' (1862); 'Leçons sur l'isomerie' (1865); 'Traité élémentaire de chimie organique' and 'Sur la force de la poudre et des matières explosives' (1872 and 1880); 'Vérifications de l'aréomètre de Baume' (1873); 'Les Origines de l'alchimie' (1885); 'Collection des anciens alchimistes grecs' (1888); 'Chimie des anciens' (1889); 'Traité pratique de calorimétrie chimique' (1893).

Berthier, bār-tyā, Louis Alexandre, marshal of France, prince and duke of Neuchâtel and Valengin, prince of Wagram: b. Versailles, 20 Nov. 1753; d. Bamberg, 1 June 1815. In the American war of independence he served under Lafayette. In 1789, Louis XVI. appointed him major-general of the national guard of Versailles, and on 5 and 6 Oct. 1790, as well as 19 Feb. 1791, he did good service to the royal family. During the reign of terror he avoided suspicion by exhibiting zeal in the Vendean war. After the 9th Thermidor, he was appointed chief of the general staff of Kellermann, and by causing the French army to take up the lines of Borghetto, contributed to arrest the advance of the enemy. Thus his reputation as a chief of the general staff was established before Bona-

parte singled him out for that post. In October 1797 Gen. Bonaparte sent him to Paris to deliver to the directory the treaty of Campo-Formio. In 1798 he received the chief command of the army of Italy, and in the beginning of February made his entrance into Rome, abolished the papal government, and established a consular one. After the 18th Brumaire, Bonaparte appointed him minister of war. He afterward became general-in-chief of the army of reserve, accompanied Bonaparte to Italy in 1800, and contributed to the passage of St. Bernard and the victory of Marengo. He signed the armistice of Alessandria, formed the provisional government of Piedmont, and went on an extraordinary mission to Spain. He then received again the department of war, which, in the meantime, had been in the hands of Carnot. He accompanied Napoleon to Milan, June 1805, to be present at his coronation, and in October was appointed chief of the general staff of the grand army in Germany. In the campaign against Austria in 1809, he distinguished himself at Wagram, and received the title of Prince of Wagram. In 1810, as proxy of Napoleon, he received the hand of Maria Louisa, daughter of the Emperor Francis I., and accompanied her to France. Somewhat later Napoleon made him colonel-general of the Swiss troops. In 1812 he was with the army in Russia, as chief of the general staff, which post he also held in 1813. After Napoleon's abdication he lost his principality of Neuchâtel, but retained his other honors, and possessed the favor and confidence of Louis XVIII. Subsequently he retired to Bavaria, where, in a fit of insanity, he committed suicide. See 'Mémoires d'Alexandre Berthier, Pr. de Neuchâtel et de Wagram' (1826).

Berthold, bër'tölt, Franz, pseudonym of **Adelheid Reinbold**, German novelist: b. 1802; d. 1839. She was warmly appreciated and furthered by Ludwig Tieck. Her story 'Fred of the Will-o'-the-Wisp' (1830), met with great favor; after her death appeared 'King Sebastian' (1839), a historical romance, and 'Collected Tales' (1842).

Berthold von Regensburg, bër'tölt fön rä-gëns-boorg, German Franciscan preacher: b. about 1220; d. 13 Dec. 1272, and buried in the Franciscan convent at Ratisbon, of which he was a member. From 1250 to the close of his life, he preached to immense congregations in Switzerland, Hungary, Austria, Moravia, Bohemia, Saxony, Swabia, etc., speaking to them from the summits of mountains or from the tops of trees. In the Heidelberg university library some MSS. of his sermons are preserved. The eloquent manner with which he exposed the iniquities of his times seems to have produced an electric effect upon his hearers. Near Glatz, in Silesia, a tent under which he had preached was exhibited long after his death, and revived the feelings of affection and reverence in which his name is held by the people. See 'Life by Unkel' (1882).

Berthollet, bār-tō-lā, Claude Louis (COUNT), French chemist of distinction: b. Talloire, Savoy, 9 Dec. 1748; d. Paris, 7 Nov. 1822. He studied medicine at Turin; went to Paris, where he became connected with Lavoisier, was admitted in 1780 a member of the Academy of Sciences in that city; was made in 1794 professor in the normal school there, and was sent to

Italy in 1796, in order to select the plunder that was to be carried to Paris. He followed Bonaparte to Egypt, and returned with him in 1799. After the 18th Brumaire he was made a member of the *senat-conservateur*; afterward count and grand-officer of the Legion of Honor. In 1804 Napoleon appointed him senator for the district of Montpellier. In 1813 he received the grand cross of the Order of the Reunion. He voted, however, for the establishment of a provisional government and the dethronement of Napoleon. Louis XVIII. made him a peer; but Napoleon passed him by in 1815. After the restoration of Louis, he took his seat again in the chamber of peers. Among the inventions and new processes with which the sciences and the arts were enriched by him, the most important are those for the charring of vessels to preserve water in ships, for the stiffening and glazing of linen, for the artificial production of nitre, etc., but principally that for the bleaching of vegetable substances by means of chlorine, which, since 1786, has been in general use in France. Besides different essays in the collections of the Academy and the Institute, he has written several larger works, among which his 'Essai de Statistique Chimique' (1803; translated into English, German, and Italian) must be considered as the most important. The complicated phenomena of chemistry were here treated as under the strict and simple laws of mechanics. He had also a large share in the reformation of the chemical nomenclature, as well as in the publication of the work that appeared on this subject in Paris, 1787—'Méthode de Nomenclature Chimique.'

Bertholletia, bër-thöl-lë'shī-ä, the generic name of Brazil nut (q.v.).

Berthoud, bär-too, Ferdinand, Swiss mechanician, celebrated for his marine chronometers: b. Plancemont, Neuchâtel, 19 March 1727; d. 20 June 1807. His father caused him to be instructed in the art of watchmaking, and, to afford him an opportunity of perfecting his knowledge, sent him to Paris. He resided in this city from 1745, and there made his first marine chronometers, which have been used by French navigators on so many occasions for extending and correcting geographical knowledge. He left several works relating to his art. His nephew, Louis Berthoud, his pupil and the heir of his talents, extended his improvements still further. His chronometers came to be very widely used by French navigators, and were even more convenient than those of his uncle.

Bertie, Willoughby, fourth Earl of Abingdon, English politician: b. 16 Jan. 1740; d. 26 Sept. 1799. He was a vigorous opponent in the House of Lords of the policy of England toward the American colonies that culminated in the Revolution; wrote a famous and very popular tract called 'Thoughts on Mr. Burke's Letter on the Affairs of America,' was active in promoting favorable legislation for Ireland, and sympathized with the French Revolution.

Bertier, bär-tyä, Francisque Edouard, French painter, now living in London: b. Paris, 1841. He was a pupil of Bouguereau and Caband, and among his many portraits of notables are those of De Lesseps, Grand Duchess Olga, Countess of Warwick, Prince of Wales, and Max O'Rell. He has several times visited the

United States in order to paint the portraits of prominent American society leaders.

Bertillon, bär-te-yôn, Alphonse, French anthropologist: b. Paris 1853. He is widely noted as the founder of a system of identification of criminals. In 1880, while chief of the bureau of identification in the prefecture of police, he established his system of measurements which has given results marvelous for their precision. The system has since been adopted by the police authorities of the large cities of Europe and the United States. He was one of the expert witnesses in handwriting in the trial of Capt. Dreyfus in 1899, and soon after its close was removed from his office. He is author of numerous works bearing upon his system, including 'Identification anthropometrique' (1893); 'La Comparaison des ecritures et l'identification graphique' (1897). See BERTILLON SYSTEM.

Bertillon System, a plan of identifying suspected criminals, invented March 1870, and set forth in 1885 by Dr. Alphonse Bertillon of Paris. Properly speaking, it is not a single system, but a combination of one invented by himself with two others approved by use, or as many more as the officers choose to employ for security. The former is that of anthropometry, or exact measurements of certain dimensions of the human body and its members; the latter are those of description—as in passports, but more extended, more precise, and with a better terminology—and photography, with still others at will. The first-named is the heart of the system, the feature which makes it instantly available; its accuracy is great, but so is that of some others; this however is the only one which can be indexed and referred to as readily as the titles of books in a library catalogue. For this reason it is rapidly becoming the standard in all countries with civilized judicial systems. It rests on three principles: (1) Easy and exact measurement of the parts of the body in a living subject; (2) extreme diversity of such dimensions in different subjects, no two ever closely approximating each other; (3) almost absolute fixity of the skeleton after 20. The measurements are taken with compasses, and include: Height, standing and sitting, reach of outstretched arms; length and width of head; length and width of right ear; length of left foot, forearm, middle and little fingers. The descriptive elements are color of eyes (the most important detail of all, as it never changes and is impossible to disguise), hair, beard, and complexion; deformities and peculiarities of shape; marks on body, as moles, scars, the tattooings frequent among criminals, etc., carefully located—as "mole six centimetres to left of fifth vertebra," or "horizontal scar on back of second phalanx of right forefinger, three millimetres below middle." A photograph of full face and one of profile are taken when thought desirable, from a fixed chair and a fixed camera. The entire process, by a measurer and a secretary who writes from dictation, takes five to seven minutes, and the measurements are correct to one thirty second of an inch. Descriptions and photograph are put together on cards of uniform size, and in the great Paris collection of 120,000,—the model for all others,—are thus classified for reference. First, approximately 20,000 females and 10,000 minors

are separated for special classification. Second, the 90,000 remaining are divided into three equal sections according to length of head: short heads, of 187 millimetres and less; medium, 187 to 194; long, 194 and above. Experience proves that these make very closely equal numbers; and their cards are placed in three tiers of drawers, the short heads uppermost. Each of these is subdivided into three of 10,000 according to width of head, without further reference to length; each of these into three of about 3,300, according to length of middle finger; each of these into three of 1,100, by length of foot; these are subdivided successively by length of forearm, full height, length of little finger, and color of eyes. These last groups contain from 12 to 14, and are classed by length of ear. The women and children are similarly classified. Thus any new measurement can be compared with its duplicate, in this enormous mass, or the absence of such record shown, with marvelous celerity and almost infallible accuracy. Its index value alone is of the first order. Under the old systems, the entire mass of descriptions and photographs had to be searched and compared with any given arrested person, and with the immense number accumulating in great cities it became physically impossible to apply it with any certainty, the senses grew so jaded and resemblances were so many; not only did the guilty escape,—it was estimated that more than half the habitual criminals remained undetected,—but the innocent were often mistaken for them. International criminals, like bank robbers and pickpockets, traveled from one city and country to another under assumed names and disguises; sometimes, when wanted for grave crimes, they committed trivial misdemeanors to be arrested and imprisoned under false names. This is now rendered futile by the combination of anthropometry with the descriptive features; and with regard to the confusion of identity, the laws of probability render it practically impossible. The system is also of great value in distinguishing new criminals from old offenders: it not merely registers identity, but the fact of a first offense. It has strengthened even the old descriptive system, by giving it a more precise vocabulary and training the officers of the law in physiognomy. It has already done admirable work, as in the discovery of King Humbert's murderer; but to make it more efficient, the local records should be gathered into national and even international bureaux. With a proper enforcement of habitual-criminals' acts, a great step would be taken toward suppressing the class of professional felons. This has been mooted in our own country, where it was introduced in 1887 by Maj. R. W. McClaughry; that it has not been fully adopted here is one reason for the infesting of the country by professionals driven out of Europe by the system. Bertillon has fully described his system in his 'Identification Anthropométrique' (1893); and Maj. McClaughry has edited 'The Bertillon System of Identification' (1896).

Bertin, bār-tāñ, Antoine, French poet: b. Isle of Bourbon, 1752; d. San Domingo, 1790. He was much admired by his contemporaries, who, somewhat extravagantly, styled him the French Propertius. He was a friend of Parny, and like him excelled in elegiac and epistolary verse. His principal works are 'Voyage in Burgundy' (1777); and 'The Loves' (1780).

Bertin, Louise Angelique, French musician and composer: b. Les Roches, near Bievres, 15 Jan. 1805; d. Paris, 26 April 1877. She was a daughter of L. F. Bertin (q.v.), and composed 'Faust,' 'Esmeralda,' 'Guy Mannering,' and other operas. Her volume of verse, 'Les Glanes' (1842), received the prize of the Academy.

Bertin, Louis François (called **BERTIN L'AÎNÉ**), French journalist: b. Paris, 14 Dec. 1766; d. 13 Sept. 1841. The Revolution made him a journalist, and in 1799 he started the famous *Journal des Débats*. His royalist principles offered Napoleon, and cost him imprisonment and banishment to Elba; thence, however, he escaped to Rome, where he formed a friendship with Châteaubriand. In 1805 he returned to Paris, and resumed the editorship of the *Débats*, but was much hampered by Napoleon. The second restoration of the Bourbons restored once more to Bertin the free control of his journal, and henceforward he gave almost constant support to the ministerial party. He supported the July monarchy, and edited the *Débats* till his death.

Bertin, Nicolas, French artist: b. Paris, 1668; d. 1736. His picture, 'The Building of the Ark,' obtained the grand prize, in 1685, and 'Prometheus Liberated by Hercules' brought him, in 1705, membership in the Academy, where he became professor in 1715. His paintings will be found in the galleries of Dresden, Stockholm, St. Petersburg, Antwerp, Amsterdam, Orleans, and Toulouse.

Bertini, Giuseppe, bër-tē'nē, gwē'sēp, Italian painter: b. Milan, 1825; d. 1898. The Milan Academy awarded him the prize for the best historical picture in 1845, and his painting on glass of 'Dante and the Divine Comedy,' exhibited in London in 1853, has been greatly admired. He became professor of painting at the Academy in 1860. Among notable pictures by him are: 'The Vision of Saint Francis of Assisi'; 'Death of Saint Joseph'; 'Tasso Introduced to the Duke of Ferrara.'

Bertrand, Henri Gratien, bārtrān, ōn-rē gra-tyān (COUNT), French military officer: b. Châteauroux, 1773; d. there, 31 Jan. 1844. He distinguished himself at Austerlitz and became Napoleon's adjutant; and, after the battle of Aspern, in 1809, for his share in saving the French army by bridges, was created count and governor of Illyria. After serving with credit in the subsequent campaigns, he retired with the emperor to Elba, was his confidant in carrying out his return to France, and finally shared his banishment to St. Helena. On Napoleon's death, Bertrand returned to France, where, though sentence of death had been pronounced upon him, a sentence which Louis XVIII. had wisely recalled, he was restored to all his dignities, and, in 1830, appointed commandant of the Polytechnic School. In 1840, he formed part of the expedition which brought back the remains of Napoleon to France.

Bertrand, James, French historical painter: b. Lyons, 1825; d. 1887. He studied in Rome, and his 'Saint Benedict Taking Communion,' exhibited at the Salon in 1859, was highly approved. He worked in the classical style, and his paintings are as notable for their careful finish as for their religious tone. They have

BERTRAND — BERWICKSHIRE

been frequently engraved. Among them are 'Death of Virginia' (1869); 'Charlotte Corday's Last Day' (1883); 'Calvary' (1884).

Bertrand, Joseph Louis François, bâr-trân, jô-sêf loo-ê frôn-swâ, French mathematician: b. Paris, 1822; d. 1900. He taught at the Polytechnic and Normal schools, and the College de France, and in 1884 became a member of the French Academy. He wrote treatises on arithmetic, algebra, calculus, thermodynamics, and probabilities, and in 1881 was appointed commander of the Legion of Honor.

Bérulle, bâ-rûl, Pierre de, French cardinal: b. near Troyes, 4 Feb. 1575; d. Paris, 2 Oct. 1629. He early showed remarkable mental acuteness and knowledge, and became distinguished for skill in controversy. He instituted, and was the first superior of, the order of Carmelites in France, and also founded the congregation of the Oratory notwithstanding the opposition of the Jesuits. He was a statesman as well as priest, and took a leading part in politics. He was often opposed to Richelieu, whose jealousy he excited, and who could not conceal his satisfaction at the news of his death. He accompanied the Princess Henrietta to England, on her marriage with the Prince of Wales. He shunned elevated positions, and was very unwillingly obliged to accept the hat of a cardinal. This elevation made no difference, however, in his humble way of life, and did not prevent him from sometimes taking part, as he had always done, in the servile work of the religious community to which he belonged. He was also a man of letters, and was the first to appreciate and encourage the genius of Descartes urging him, by his sense of obligation to his Creator, to make known to the world his discoveries. The most noted of his writings is 'Les Grands de Jésus.'

Bervic, bâr-vek, Charles Clément, French engraver: b. Paris, 1756; d. 1822. The works of Bervic are among the best of the French school, but are not numerous. The most celebrated of them is the full-length figure of Louis XVI., after a picture of Callot. The copies are very rare and dear, because the plate was broken to pieces in the revolutionary tumults of 1793. The exactness of his drawing, the firmness and brilliancy of his touch, the purity and correctness of his design, and the happiness with which he transferred to his plate the beauties of the original, gave a high character to his productions.

Berwick, James Fitz-James (DUKE OF), French marshal: b. Moulins, 1670; d. 1734. He was the natural son of the Duke of York, afterward King James II., and Arabella Churchill, sister of the Duke of Marlborough; and first went by the name of Fitz-James. He received his education in France, and served his first campaigns in Hungary under Charles, Duke of Lorraine, general of Leopold I. He returned to England at the age of 17, and received from his father the title of Duke. On the landing of the Prince of Orange in 1688 he went to France with his father, whom he afterward accompanied on the Irish expedition. He fought bravely and was wounded at the battle of the Boyne, 1 July 1690. He afterward served under Luxembourg in Flanders; in 1702 and 1703 under the Duke of Burgundy; then under Marshal Villeroi, and

was naturalized in France. In 1706 he was made marshal of France, and sent to Spain, where he gained the battle of Almanza, which rendered King Philip V. again master of Valencia. In 1709 he went to take the command in Dauphiné, and the measures which he took to cover this and the neighboring provinces against the superior forces of the Duke of Savoy gained him a great reputation. In 1718 and 1719 he was obliged to serve against Philip V., who from gratitude to the marshal had taken a son of his into his service. On his entrance into the Spanish dominions he wrote to his son, the Duke of Liria, admonishing him to do his duty to his sovereign. At the siege of Philipsburg, on the Rhine, his life was terminated by a cannon-ball. His memoirs were published originally in French, and have gone through two or three editions in English. Consult Wilson, 'Duke of Berwick, Marshal of France' (1883).

Berwick-on-Tweed, England, a seaport town, once forming a county of itself, but now incorporated in Northumberland, on the north or Scottish side of the Tweed, within half a mile of its mouth. It is surrounded by walls which are well preserved, and along which is an agreeable promenade. The streets are for the most part narrow, steep, straggling, and irregular, though some of the principal ones are wide and open. The Tweed is crossed at the town by an old bridge of 15 arches, 1,164 feet long and only 17 wide, and by a magnificent railway viaduct of stone, 667 yards long and 184 feet in extreme height, with 28 semicircular arches. The chief industries are iron-founding, the manufacture of engines and boilers, agricultural implements, feeding-cake, manures of various kinds, ropes, twine, etc. The chief exports are grain, artificial manures, and herrings. A dock affording accommodation for large vessels was opened in 1876. In the beginning of the 12th century, during the reign of Alexander I., Berwick was part of his realm of Scotland, and the capital of the district called Lothian. Soon after this date it became populous and wealthy, was the chief seaport of Scotland, contained a strong castle, with churches, hospitals, and monastic buildings, and was created one of the four royal burghs of Scotland. In 1266 the town and castle were stormed and taken by King John. During the competition between Baliol and Bruce for the Scottish throne the English Parliament sat in Berwick; and in the hall of the castle Edward I. pronounced judgment in favor of Baliol. Bruce retook the town and castle in 1318; but, after undergoing various sieges and vicissitudes, both were surrendered to Edward IV. in 1482, and have ever since remained in possession of England.

Berwickshire, a maritime county of Scotland, nominally divided into the three districts of Lauderdale, Lammermoor, and the Merse or March. The principal rivers of the county are the Tweed, the Leader, the Eye, the Whiteadder, and the Blackadder; and all except the last contain salmon, of which great quantities are shipped from Berwick for London. Vast quantities of agricultural produce are shipped from the ports of Berwick and Eyemouth, and much is also sent to Edinburgh, Dalkeith, Haddington, and Dunbar. Very few manufactures are established in this county, the principal one

BERYL—BESANCON

which it supplies beyond domestic consumption being that of paper. The North Sea fisheries are of great importance. Berwick formerly abounded in strong castles and fortified places, traces of which are to be found everywhere. The county town is Greenlaw. Other small towns are Duns and Eyemouth. Pop. about 31,000.

Beryl, a native silicate of aluminum and the rare metallic element glucinum (or "beryllium"), having the formula $3\text{GIO} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2$, and crystallizing in the hexagonal system. It commonly has a specific gravity of 2.70, and a hardness of from 7.5 to 8. A portion of the glucinum is sometimes replaced by lithium, sodium or cesium, and chemically combined water is also occasionally present. In the latter case the formula of the mineral appears to be $\text{H}_2\text{Gl}_2\text{Al}_2\text{Si}_2\text{O}_{12}$. Beryl is usually transparent or translucent, and in color may be green, blue, yellow, white, or light red. A variety which is transparent, and bright green from the presence of oxide of chromium, is known as "emerald," and is highly esteemed as a gem (see GEMS); the "Oriental emerald" (see SAPPHIRE), however, is not a variety of beryl, but a green variety of sapphire. A bluish-green variety of the common beryl, known as "aquamarine," is also used as a gem. Beryl occurs in all parts of the world, being commonly associated with granite. Its crystals are sometimes enormous in size, and two specimens from Grafton, N. H., are known, which weigh 2,900 pounds and $2\frac{1}{2}$ tons, respectively. The finest emeralds (q.v.) are from Bogota; aquamarines (q.v.), from Siberia, Brazil, Maine, North Carolina and Colorado; golden beryls, from Connecticut and North Carolina.

Beryllium, a rare metallic element, called "beryllium" from the fact that it was first found in the beryl. Its salts have a sweetish taste, and from this circumstance the element itself has received the name glucinum (q.v.).

Beryx, bër'iks, the designation of a genus of deep sea fishes in tropical waters belonging to the group *Berycoidei* and family *Berycidae*. *B. splendens*, deep red with bright streaks, is one of the most beautiful of the Cuban fishes.

Berzelius, ber-tsä'li-üs, **Jöns Jakob** (BARON), Swedish chemist of distinction: b. Westerlösa, East Gothland, Sweden, 29 Aug. 1779; d. Stockholm, 7 Aug. 1848. The first fruit of his studies, and of a year's residence as assistant to a physician at the famous watering-place of Medewi, was the 'Nova Analysis Aquarum Medeviensium' (1800). After publishing a tract entitled 'De Electricitatis Galvanicæ in Corpora Organica Effectis' (1802), and taking his doctor's degree, he was appointed by the board of health in 1802 adjunct of medicine and pharmacy in Stockholm. In 1807 he became professor of medicine and pharmacy in Stockholm. Here, along with other medical practitioners, he instituted the Swedish Medical Society. In 1808 he was admitted a member of the Academy of Sciences at Stockholm, in 1810 one of its directors, and in 1818 its perpetual secretary. This office he continued to hold during the remainder of his life. In 1818 the king, while allowing him to retain his own name, made him a noble; and in 1835, on the occasion of his marriage with a daughter of Poppus, a counselor of state, he was named a baron. The existing state of chem-

istry is founded in a great measure on his discoveries and views, though, by the rapid development of the science, the edifice which he erected has undergone many alterations, and several defects have been discovered in it. Hence his views in regard to atomic weights, his electro-chemical theory, and his mode of procedure in organic chemistry, have met with many opponents. He discovered selenium and thorium, first exhibited calcium, barium, strontium, tantalum, silicium, and zirconium in the elemental state, and investigated whole classes of compounds, as those of fluoric acid, the metals in the ores of platinum, tantalum, molybdenum, vanadium, sulphur salts, etc. He introduced a new, or at least a wholly altered nomenclature and classification of chemical compounds. In short, there is no branch of chemistry to which he has not rendered essential service; and his labors are so numerous that, when the accuracy with which they have been executed is kept in view, it becomes almost incomprehensible how one man should have been able to perform them. It ought to be especially mentioned that he never rested satisfied with the bare investigation of isolated facts, but always extended his investigations over a wide field, so as to contribute to the advancement of chemistry as a whole. In addition to his numerous communications to the journals and periodicals of the period, may be mentioned, among his separate works, his 'View of the Composition of Animal Fluids,' 'New System of Mineralogy,' 'Essay on the Theory of Chemical Proportions,' and above all his 'Text-book of Chemistry,' which has been translated into most European languages. As secretary of the Academy of Sciences, he published an annual account of the progress of chemistry and mineralogy, which, having been continued during 27 years, extends to as many volumes. See Söderbaum, 'Berzelius, Werden und Wachsen' (1899).

Berzsenyi, bër'zhā-nyî, **Daniel**, Hungarian poet: b. Heyte, 1776; d. 1836. An authorized version of his 'Versei' appeared in 1813 and in 1816 was reprinted with his consent and speedily became classic in Hungarian literature.

Bea, an Egyptian god, represented clad in a lion's skin, with the head and skull of the animal concealing his features, and with a dwarfish and altogether grotesque appearance. He was supposed to preside over art, music, the dance, and childbirth.

Besançon, bē-zān-sōn, France, a fortified town, capital of the department Doubs, 206 miles southeast of Paris. The town is surrounded by hills, covered with vineyards. The isthmus or peninsula on which it is built is composed of a mass of rocks crowned by the citadel, which commands the country toward the north, but the citadel itself is commanded by several eminences in the neighborhood, on which forts have been erected for the purpose of securing the approaches. Besançon is one of the strongest towns in France, and also one of the best built. The streets are spacious and well laid out, and the squares are adorned with fountains. The citadel is one of Vauban's finest works. There are here a theatre, a large and valuable public library, a museum, a botanic garden, school of artillery, lyceum, etc. The trade and manufactures are extensive. The latter comprise linen, cotton, woolen, and silk goods, ironmon-

gery, etc.; but the principal industry is watch-making. It employs about 15,000 workmen who make as many as 400,000 watches yearly. There are also extensive foundries, breweries, saw-mills, and tanneries. Besançon is the ancient Vesontio, Besontium, or Bisontium, which is mentioned by Cæsar, who drove the Sequani from it in 58 B.C., as a place of great extent and natural strength. Several of the streets and places still bear their old Roman names, and there are numerous Roman remains, especially a triumphal arch of the Emperor Aurelian, an aqueduct, an amphitheatre, and a large theatre. Pop. about 59,000.

Besant, bēs-ānt, Annie, English theosophist and author: b. London, 1 Oct. 1847. She was married in 1867 to the Rev. Frank Besant, brother of Sir Walter Besant, but was legally separated from him in 1873. She manifested an earnest interest in social and political topics, and, in 1874, became connected with the National Secular Society. Owing to the publication of 'Fruits of Philosophy,' Mrs. Besant was prosecuted, in connection with Charles Bradlaugh (June 1877), but the prosecution failed. Mrs. Besant has since stated her disagreement with the sentiments expressed in this book. In 1883 she announced her adhesion to Socialism. For three years she was a member of the school board of London. She has been prominently connected with various socialistic movements, and a frequent speaker at meetings for workingmen, and in 1899 joined the Theosophical Society, and has since been active in theosophical propaganda in Great Britain and the United States. She visited the United States in 1891 and 1892-3 and lectured on Madame Blavatsky and reincarnation, and on theosophy and occultism. Among her numerous publications are 'Reincarnation'; 'Seven Principles of Man'; 'Autobiography'; 'Death and After'; 'Building of the Kosmos'; 'In the Outer Court'; 'Karma'; 'The Self and Its Sheaths'; 'Path of Discipleship'; 'Man and His Bodies'; 'Four Great Religions'; 'The Ancient Wisdom'; 'Three Paths to Union with God'; 'Evolution of Life and Form'; 'Dharma'; 'Avatars'; 'Ancient Ideals in Modern Life'; 'Esoteric Christianity'; 'Thought-Power'; 'The Religious Problem in India'; and in connection with G. R. S. Mead, translations of tracts and reviews.

Besant, bē-zānt', Sir Walter, English novelist: b. Portsmouth, England, 14 Aug. 1836; d. London, 9 June 1901. He was educated in London and at Christ's College, Cambridge, where he graduated with mathematical honors. He was for a time professor in the Royal College, Mauritius. His first work, 'Studies in Early French Poetry,' appeared in 1868, and to the field of French literature also belong his 'French Humorists' (1873), and his 'Rabelais' (1877 for the 'Foreign Classics' series). He was for years secretary to the Palestine Exploration Fund, and published a 'History of Jerusalem' (1871) in conjunction with Prof. Palmer, a life of whom he also wrote. The 'Survey of Western Palestine' was edited by him. He is best known by his novels, a number of which were written in partnership with the late James Rice, including 'Ready-Money Mortiboy' (1872); 'This Son of Vulcan';

'The Case of Mr. Lucraft'; 'The Golden Butterfly' (1876); 'The Monks of Thelema'; etc. After Mr. Rice's death (1882) Sir Walter wrote: 'All Sorts and Conditions of Men' (1882), which led to the establishment of the People's Palace in London; 'All in a Garden Fair' (1883); 'Dorothy Foster' (1884); 'The World Went Very Well Then' (1887); 'The Ivory Gate' (1892); 'The Rebel Queen' (1893); 'Beyond the Dreams of Avarice' (1895); 'The Orange Girl' (1899); 'The Alabaster Box' (1900); 'The Story of King Alfred' (1901), etc. Among his other works are 'The Eulogy of Richard Jeffries' (1888). He labored for many years to promote the interests of all members of the literary profession, more especially in his capacity as editor of the monthly paper, 'The Author.' On 24 May 1895, he was knighted.

Be'show, the Alaskan pollack. See POLLACK.

Beside the Bonnie Brier Bush, a novel by Ian Maclaren (the Rev. Dr. John Watson), delineating Scottish character and life among the lowly. It consists of short sketches with no attempt at plot, but interest attaches to the well-drawn characters. It is one of the best examples of what has been styled the "kail-yard" school of fiction, whose principal exponents are Crockett, Barrie, and Watson.

Bes'ika Bay, an inlet of the Ægean Sea on the northwest coast of Asia Minor, opposite Tenedos, to the south of the entrance of the Dardanelles. The English fleet was stationed here during crises in the Eastern question in 1853-4 and 1877-8.

Beskow, bēs'kōv, Bernhard, Swedish dramatist: b. Stockholm, 19 April 1796; d. 17 Oct. 1868. He was ennobled in 1826 and appointed marshal of the royal household in 1833. He officiated for some time as director of the royal theatre, and is the author of several excellent tragedies, which were translated into Danish and German by Oehlenschläger, and of which 'Tor- kel Knutsson' is considered the best acting play on the Swedish stage. He wrote an opera, 'Trubaduren,' for which Oscar, the present king of Sweden, composed the music. His literary reputation was increased by his books of travel, by his poetical works, and by his contributions to the press. The great prize of the academy was awarded in 1824 to his poem 'Sveriges anor.'

Bessara'bia, a province in European Turkey since the Peace of Bucharest, in 1812, between Turkey and Russia. It extends in a northwesterly direction from the Black Sea, between the Pruth and the Dniester; area, 17,619 square miles. A portion of it at the southeast extremity was ceded to Turkey in 1856, but was restored in 1878. Agriculture is chiefly developed in the north, pasturage is most largely carried on the south, in the middle portion are extensive forests. It is watered by the Dniester, the Pruth, and the Danube. The inhabitants include Russians, Poles, Rumanians, Bulgarians, Germans, Armenians, Jews, etc. The capital is Kishenev. The products are salt, wool, tallow, leather, soap, etc. Pop. 1,782,900.

Bessa'ron, Johannes, or Basilus, Greek monk: b. Trebizond, 1380; d. Ravenna, 19 Nov. 1472. He was titular patriarch of Constantino-

ple, archbishop of Nicæa, afterward cardinal and legate to France, in the time of Louis XI. After having spent 21 years in a monastery of Greece, devoted to theology and literature, he left it to follow the Emperor John Palæologus to Italy, with the intention of being present at the Council of Ferrara, in the hope of uniting the Greek and Latin churches. They were accompanied by many Greeks, distinguished by their talents and dignity. Bessarion seconded with so much zeal the projects of Palæologus that he became odious to the Greek Church, while Pope Eugenius IV. rewarded him for his devotion to that of Rome, by the dignity of cardinal-priest. He was sent to France by Sixtus IV., to reconcile Louis XI. with the Duke of Burgundy, and obtain aid against the Turks. He did not succeed, and it is pretended that he received a personal insult from the king, which humiliation some suppose to have been the cause of his death.

Bessel, Friedrich Wilhelm, German astronomer: b. Minden, Prussia, 22 July 1784; d. 17 March 1846. An astronomical tract which he had drawn up brought him into communication with Olbers, who encouraged him in his labors, and procured for him the appointment of inspector of astronomical instruments to the University of Göttingen. In 1810 he removed to Königsberg, and in 1812-13 superintended the construction of the observatory of this town. From 1824 to 1833 he completed a series of 75,011 observations on the celestial zone contained between 15° N. and 15° S. declination. These observations included all the stars in the zone as far as the ninth magnitude. A dissertation which he published in 1844 contains important investigations on the variability of the movements of the fixed stars. An important share in the discovery of the new planet Neptune belongs to him, as in a paper read in 1840 he called attention to the existence of a planetary mass beyond Uranus, founding on considerations which were afterward happily proved to be correct. His principal works are an 'Essay on the Path Traversed by the Comet of 1807'; 'Astronomical Observations' during various years; 'Determination of the Length of the Pendulum Which Beats Seconds at Berlin'; 'Investigations and Measurements made with a View to Establish a Metrical Unit for Prussia'; 'Measure of the Distance of the Sixty-first Star of the Constellation of the Swan'; and 'Popular Lectures on Scientific Questions.' These last, consisting of papers which Bessel had read before the Physico-economical Society of Königsberg from 1832-44, were published in 1848.

Bessels, Emil, German naturalist: b. Heidelberg, 2 June 1847; d. Stuttgart, 30 March 1888. He was educated in the University of Heidelberg, and while an assistant at the Royal Museum in Stuttgart became interested in the subject of Arctic research. In 1869 he was a member of Petermann's expedition that sailed into the sea between Spitzbergen and Nova Zembla. In 1871 he came to the United States and was appointed both naturalist and surgeon to the expedition under Capt. Charles F. Hall, United States navy. Most of the scientific results of this expedition were gathered by his personal efforts, and published under the title of 'Report on the Scientific Results of the

Polaris Expedition' (1876). In 1879 he published a German narrative of the expedition, illustrated with his own sketches. Later he returned to Germany, where he devoted himself to literary pursuits, art and geographical instruction.

Bessemer, Sir Henry, English inventor of distinction: b. Charlton, Hertfordshire, 19 Jan. 1813; d. London, 15 March, 1898. He received mechanical training at an early age in the type-foundry of his father, a French artist, and going to London at 18 began his career as a modeler and designer. His earliest invention was an improved method of stamping deeds which the revenue office straightway adopted without giving him any compensation therefor. Late in life he brought the matter to the attention of the government and was then knighted (1879) in acknowledgment of his services in this particular. His inventive ability was next turned to the production of a new method of making bronze-powder or "gold" paint, as it was called, which proved a commercial success, and subsequent inventions of his were machines for making Utrecht velvet and improvements in type-casting machinery. At the time of the war in the Crimea he designed a projectile intended to revolve in its flight, but as the cannon of that day were not strong enough to permit of its use, he went on experimenting in Paris under the patronage of Louis Napoleon till he had secured a much improved kind of cast iron. This, however, did not fully satisfy him and he continued at work refining the iron until steel was produced. He took out patents for this invention in 1855, but persevered in experiments till at his London bronze factory steel ingots had been manufactured which could be rolled into rails without hammering. When this process had become fully developed the Bessemer Steel Works were built in Sheffield, where, besides employing a large number of workmen in steel manufacture, many others were trained for similar work in factories all over the world. On 13 Aug. 1856, he read before the British Association at Cheltenham a paper dealing with the invention which has made his name famous, "The Manufacture of Malleable Iron and Steel without Fuel." This was a new and cheap process of rapidly making steel from pig-iron by blowing a blast of air through it when in a state of fusion, so as to clear it of all carbon, and then adding just the requisite quantity of carbon to produce steel—a process which has introduced a revolution in the steel-making trade, cheap steel being now made in vast quantities and used for many purposes in which its price formerly prohibited its application. At the Birmingham meeting in 1865 he read a second paper "On the Manufacture of Cast Steel, Its Progress and Employment as a Substitute for Wrought Iron." The Bessemer process has not only stimulated the growth of the steel industry but greatly reduced the cost of manufacture and rendered steel available for rails and general engineering work. Since 1858, when the Sheffield works, the principal ones in England, produced less than 50,000 tons the amount manufactured has increased until in 1896 Great Britain produced 1,815,842 tons of Bessemer steel and the United States 3,019,906. In the past 50 years the Bessemer process has seen but few improvements of any importance.



SIR HENRY BESSEMER.

BESSEMER—BESTIARIES

Beside his great invention, that of the Bessemer process, with others previously named, Bessemer was also the originator of a method still in use for compressing into a solid block the graphite employed in the manufacture of lead pencils; of a system of rollers for embossing and printing paper; of improvements in telephones; and of a ship with a stationary cabin, the latter the only failure of note in the long series of his inventions. In 1859 he received the Telford Medal of the Institute of Civil Engineers; and in 1872 the Albert Medal of the Society of Arts. He was president of the Iron and Steel Institute of Great Britain, 1871-3, and in 1879 became a Fellow of the Royal Society. Engineers have sometimes felt that Bessemer did not receive from his own government the honors that his distinguished services to British industrial development merited and that he was in effect more highly esteemed in the United States where eight localities and one railway bear his name. Bessemer was an honorary member of many foreign scientific and engineering societies, among which was the American Society of Mechanical Engineers. Before the latter, in December 1896, he presented a paper entitled "The Origin of the Bessemer Process," printed in its 'Transactions' (Vol. XVII. 1890). See **STEEL MANUFACTURE**.

Bessemer, Ala., a city in Jefferson County, on several trunk railroads; 12 miles southwest of Birmingham, the county-seat. It was founded in 1887 as a manufacturing place because of the valuable iron and coal mines in its immediate vicinity. It contains iron foundries, coke ovens, a number of blast furnaces, machine shops, planing mills, iron pipe works, fire brick works, and other works connected with the iron and steel industry. It has four banks, several weekly newspapers, electric lights, waterworks, and a property valuation of \$3,000,000. It is governed by a mayor elected biennially and a city council. Pop. (1910) 10,864 within incorporated limits.

Bessemer, Mich., city and county-seat of Gogebic County, on the Chicago & N. W. and several other railroads; 40 miles east of Ashland, Wis. It is in an important iron mining and lumbering region; was founded in 1884, and has become important by reason of its mining and manufacturing and its trade relations with the surrounding territory. It has a good school system and a notably fine high school building, city-hall, stone court-house, a national bank, churches of all denominations, and weekly newspapers. Pop. (1910) 4,583.

Bessemer Steel Process. See **BESSEMER, SIR HENRY**; **STEEL MANUFACTURER**.

Bessey, Charles Edwin, American botanist; b. Wilton, Ohio, 21 May 1845. He was professor of botany in the Iowa Agricultural College in 1870-84; and has been professor of botany in the University of Nebraska since 1884. He was also president of the Society for the Promotion of Agricultural Science in 1883-5; president of the Nebraska Academy of Sciences in 1891; acting chancellor of University of Nebraska 1888-91 and 1899-1900; Fellow of the American Association for the Advancement of Science. His publications include: 'Reports on Insects' (1873-4); 'Geography of Iowa' (1876); 'The Erysiphei of North America' (1877);

'Botany for High Schools and Colleges' (1880); 'Essentials of Botany' (1884); 'Reports of the State Botanist of Nebraska' (1887 to 1892); 'Elementary Botany' (1904); 'Plant Migration Studies' (1905). He was editor of the department of botany of 'Johnson's Universal Cyclopedia,' in 1892-5; and is one of the editors of 'Science.'

Bessières, bès-yâr, Jean Baptiste (DUKE OF ISTRIA), French marshal; b. Preissac, 6 Aug. 1768; d. Lutzen, 1 May 1813. Entering the army in 1792 as a private soldier, in less than two years he had attained the rank of captain. After making the Spanish campaign, he passed into the army of Italy, and soon attracted the notice of Napoleon, who took him to Egypt in 1798, where his conduct at St. Jean d'Acre and Aboukir covered him with glory. At the accession of Napoleon to the throne, he became marshal of France. He showed his usual conspicuous courage at Austerlitz, Jena, Eylau, and Friedland, and, raised to the rank of Duke of Istria, commanded in Spain in 1808-9. In the Russian campaign he led the cavalry of the Guard, and did much by his sleepless courage and presence of mind to save the wreck of the army in the disastrous retreat from Moscow. On the morning of the battle of Lützen he fell mortally wounded by a cannon ball.

Best, William Thomas, English musician; b. Carlisle, 13 Aug. 1826; d. Liverpool, 10 May 1897. In 1848 he was appointed organist of the Philharmonic Society in Liverpool; in 1852 he went to London and became organist of the Panopticon of Science and Art, and also of the Church of St. Martin-in-the-Fields; in 1854 was organist of Lincoln's Inn Chapel; in 1855 returned to Liverpool, and became organist of St. George's Hall; in 1868 was organist of the Liverpool Musical Society; and in 1872 was again engaged by the Philharmonic Society. He was the author of 'The Modern School for the Organ' (1853); 'The Art of Organ Playing' (1870); 'Arrangements from the Scores of the Great Masters' (1873); 'The Organ Student'; 'Organ Concertos'; 'Opera and Oratorio Songs,' etc.

Bestiaries, the name given to certain extremely popular books of the Middle Ages. In the written volumes, sometimes with copious illustrations, were given descriptions of animals, real and imaginary, which was which being left to the discretion or knowledge of the readers. They were composed in verse or prose or a mixture of both, and were designed not only as hand-books of zoology, but as teachers of morals as well. It was the fashion to attach spiritual meanings to the animals or their actions, until every quality of good or evil in the soul of man had its type in the beast world. It is to the bestiaries that we must look for explanation of the strange, grotesque creatures which are found sculptured on the churches and other buildings of the Middle Ages. The oldest Latin bestiaries had an early Greek original, the well-known 'Physiologus,' under which name about 50 such allegories were grouped. The Greek text of this famous work is found only in manuscript. There are old Syriac, Armenian, Ethiopic, Arabic, Icelandic, and numerous Latin versions. Editions of the Latin have been issued—Mai, Heider, and Cahier. An Old High German version was made earlier than the 11th century; in the 12th century, ver-

sions in French were made by Philippe de Thau and Guillaume, a priest of Normandy. The 'Bestiary of Love' of Richard de Fournival was rather a parody upon the earlier form of such books. The following is a characteristic extract from the 'Divine Bestiary': 'The unicorn has but one horn in the middle of its forehead. It is the only animal that ventures to attack the elephant; and so sharp is the nail of its foot, that with one blow it rips up the belly of that most terrible of all beasts. The hunters can catch the unicorn only by placing a young virgin in the forest which it haunts. No sooner does this marvelous animal descry the damsel than it runs toward her, lies down at her feet, and so suffers itself to be taken by the hunters. The unicorn represents our Lord Jesus Christ, who, taking our humanity upon him in the Virgin's womb, was betrayed by the wicked Jews, and delivered into the hands of Pilate. Its one horn signifies the Gospel truth, that Christ is one with the Father,' etc.

Bestuzheff, bē-stoo'zhēf, Alexander Alexandrovitch, Russian novelist and soldier: b. St. Petersburg, 3 Nov. 1797; d. 19 July 1837. Of his numerous novels, the most celebrated are 'Ammalat-Beg'; 'The Nadeshda Frigate'; 'The Terrible Prophecy.' His 'Private Correspondence' is highly prized. He was killed in battle in the Caucasus.

Bestuzheff-Ryumin, bē-stoo'zhēf ryoo'men, Count (MICHEL ALEXEI PETROVITCH), Russian statesman: b. Moscow, 1693, of a family of English origin, and of the second class of nobles in Russia; d. St. Petersburg, 24 April 1766. He entered the civil service under Peter the Great, and became a diplomatist. Under the Empress Anne he was made a member of the cabinet, and the Empress Elizabeth, whose fullest confidence he possessed, created him count, great chancellor of the empire, and his influence in the government was almost boundless. He was strongly opposed to the Prussian and French diplomatic influence, and was disliked on this account by Peter III., nephew and presumptive heir of Elizabeth. He concluded several treaties with England, Sweden, and Denmark, favorable to English policy. By a treaty concluded in 1747, he paved the way for the union of Schleswig and Holstein with the kingdom of Denmark. By his influence, the Russian troops supported Austria against Frederic the Great in the Seven Years' war. But their commander, Apraxin, retired to Russia, and this occasioned the fall of Bestuzheff. He was imprisoned and degraded, but Catharine II., in 1762, restored him to liberty and to his previous social position. He is regarded as the inventor of a chemical preparation known in medicine under the name of *tinctura tonica Bestucheffi*.

Be'tain, or Be'taine, an organic base, having the chemical composition $C_8H_{11}NO_2$, obtained from the juice of the common beet, or from beet-root molasses. It is not present in the beet-root in nature, but is obtained from it by the action of baryta or hydrochloric acid. The hydrochloride is one of its most important salts, and numerous others are also known.

Betanzos, bā-tān'thōs, Juan Jose de, Spanish adventurer of the 16th century. He settled at Cuzco, Peru, where he married a daughter of the inca and at the command of Mendoza,

the viceroy, wrote an account of the conquest of Peru by Pizarro. It remained in manuscript till 1880, when it was published with the title, 'Suma y Narracion de los Incaa.'

Be'tel, Betle, Pawn, or Pinang, popular Oriental names for various species of Piper, especially *P. betle*, and *P. siriboa*, climbing shrubs cultivated in the East for their leathery leaves which are used to a prodigious extent with bits of areca-nut and shell lime for chewing, particularly by the Malay races. The plants are trained upon trellises, poles, etc., in shady but hot and moist places, which in northern India are secured by means of sheds. Europeans do not take readily to the habit because the mixture is hot, acrid, astringent, abrades the mouth, temporarily destroys the sense of taste, reddens the lips as if they were covered with blood and blackens the teeth, which are sooner or later destroyed. At 25 years of age, habits are often toothless. Among East Indian races the habit dates back more than 2,400 years and at the present time is as general as was the habit of using snuff among Europeans; the betel box is carried by old and young, men and women, and presented, upon all occasions. Opinions differ as to the utility or perniciousness of this habit, some writers claiming advantages which in the face of the above-mentioned facts seem as far-fetched as like arguments in defense of the similar use of tobacco.

Betelgeuse, bēt-ēl-gēr'z, the star Alpha Orionis, the bright, reddish star in one of the shoulders of Orion. It varies somewhat in brightness, but in no regular period.

Beth Peor, bēth pē'or (Hebrew, house of Peor), a city where the Israelites are said to have received the laws of Deuteronomy, and the supposed locality of Moses' burial. The precise locality of Beth Peor is undetermined, however, and various points have been suggested as probable sites, but the only theory which seems reasonably sure is that it stood somewhere among the Nebo-Visgah Mountains.

Beth'am-Edwards, Matilda, English author: b. Suffolk, 1836. She was privately educated, and has published numerous works in poetry, fiction, and on French rural life. She was made an officer of public instruction in France in 1891. Among her works are 'The White House by the Sea'; 'Kitty'; 'The Dream Charlotte'; 'France of To-day'; 'A Romance of Dijon'; 'The Lord of the Harvest,' a volume of poems, and an edition of Arthur Young's 'Travels in France.'

Beth'any, a village of Palestine, at the foot of Mount Olivet, on the eastern side, about two miles east of Jerusalem, where Lazarus dwelt and was raised from the dead, and where the ascension of Christ is related to have taken place. The house and grave of Lazarus, and the house of Mary Magdalene, are still shown to travelers.

Bethany College, a co-educational institution in Lindsborg, Kan.; organized in 1881 under the auspices of the Lutheran Church; reported at the end of 1910: Professors and instructors, 40; students, 898; volumes in the library, 10,000; grounds and buildings valued at \$120,000; income, \$72,700; number of graduates, 809; president, Rev. E. F. Pihlblad, A.M.

Bethany College, a co-educational institution in Bethany, W. Va.; organized in 1841 under the auspices of the Church of the Disciples; reported at the end of 1910: Professors and instructors, 19; students, 342; volumes in the library, 11,000; grounds and buildings valued at \$200,000; income, \$9,000; president, T. E. Cramblet, A.M. LL.D.

Beth'el, a town of Palestine, about 10 miles from Jerusalem, now called Beitin, or Beiteen. The patriarch Jacob here had a vision of angels, in commemoration of which he built an altar. Interesting ruins abound in the vicinity.

Bethel College, an educational institution in Russellville, Ky.; organized in 1854 under the auspices of the Baptist Church; reported at the end of 1910: Professors and instructors, 9; students, 87; volumes in the library, 7,000; grounds and buildings valued at \$120,000; productive funds, \$125,000; income, \$16,500; number of graduates, 275; president, Wm. H. Harrison, M.A.

Bethencourt, Jean de, bā-tōn-koor, zhōn dē, king of the Canary Islands: d. 1425. He was chamberlain to Charles VI. of France, but being ruined in the war with England, he sought to repair his fortunes in foreign countries, and made a descent from Spain on the Canary Islands in 1402. Not having sufficient force, however, he returned, and obtained reinforcements from Henry III. of Castile, with which he was successful, and was crowned king in 1404, under the title of Louis. He converted the greater portion of the Canaries to Christianity, and in 1405 received from the Pope the appointment of bishop to the islands. The following year he went to Normandy, where he passed the remainder of his days.

Bethesda, bē-thēz'dā, a pool in Jerusalem, the name of which signifies "house of mercy." In the five halls or porticos near it many patients lay waiting, according to the account of John (ch.v.), for the moving of the waters, to bathe in. According to the belief of the Jews, an angel descended, at a certain time, into the pool and troubled the water, and whoever first entered the water after this agitation was cured. In 1888 a rock-hewn basin or reservoir was discovered, with five chambers adjoining, which is supposed to be identical with the pool of Bethesda.

Bethlehem, bēth-lē-ēm, or -hēm, Palestine; a village five miles from Jerusalem, at the foot of a hill covered with vines and olive-trees; the birthplace of Jesus Christ. An aqueduct conveys water from the hill to the village. Its inhabitants are chiefly Christians, and make rosaries, crucifixes, etc., for pilgrims. There are three convents here, for Roman Catholics, Greeks, and Armenians, surrounding a stately church said to have been erected by the Empress Helena in 327, over the place where Christ was born. It is built in the form of a cross, and separate portions of it are allotted to the Latins, Greeks, and Armenians, respectively. On either side of the nave are two rows of beautiful columns, marking off two corresponding aisles. The top commands a fine view over the surrounding country. In a rich grotto, furnished with silver, and crystal lamps, under the choir of this church, a trough of marble is shown, and is said to be the manger in which Jesus was

laid after his birth. Several other spots of interest are shown here. Bethlehem is also famous as the birthplace of King David. It was laid waste by Hadrian in 132 and since then has never been a place of great importance. Since the building of the church Bethlehem has been one of the great pilgrim shrines of Palestine. Pop. about 7,000, chiefly Christians, the Mussulman quarters having been destroyed in 1834.

Bethlehem, Pa., a borough in Northampton County; on the Lehigh River and canal, and the Lehigh V., the New Jersey C., and other R.R.'s; 57 miles north of Philadelphia. It was founded in 1741 by Moravians under Count Zinzendorf, and is the chief centre of that sect in the United States. It contains a Moravian theological seminary, a Moravian seminary for young ladies, more than a dozen churches, and two national banks. On the opposite side of the river, here spanned by two bridges, is South Bethlehem, the seat of Lehigh University (q.v.), the main offices of the Lehigh Valley Railroad Company, and a number of important manufacturing establishments, including silk mills, rolling mills, foundries and machine shops, brass works, zinc oxid and spelter works, etc. Monocacy Creek separates Bethlehem from West Bethlehem, formerly a separate borough but now consolidated with Bethlehem borough. Bethlehem is attaining a conspicuous position in the musical world from the institution of an annual festival which has developed from the great love of the Moravians (q.v.) for music in their religious services, and especially for the compositions of John Sebastian Bach. The first organized festival was held in 1901. For musical and other ceremonies of the Moravian church see MORAVIAN CHURCH. Pop. (1910) Bethlehem, 12,837; South Bethlehem, 19,973.

Bethlehemites, an order of monks somewhat like the Dominicans, who settled in England in 1257. They were so named because they wore on the breast a five-pointed star in commemoration of the star that appeared at the birth of Jesus. The order was comparatively insignificant and had only one convent in England (at Cambridge). An order of American Bethlehemites, sanctioned by Innocent XI. in 1687, was established in the city of Guatemala by a Franciscan monk named Bethencourt, a native of the island of Teneriffe, about 1655. A female order of Bethlehemites also was founded by Maria Anna del Galdo, who belonged to the Tertiaries of St. Francis. Twenty years later the privileges of the order were enlarged to an equality with those of the Augustinians, Dominicans, and Franciscans. The followers of Huss are sometimes called Bethlehemites, from the church in Prague in which Huss preached.

Bethlen-Gabor, bēt-lēm gā'bōr, or **Gabriel Bethlen**, Prince of Transylvania: b. 1580; d. 1629. He was of humble origin, but at the age of 17 he entered the service of Gabriel Bathori, prince of Transylvania, fought under his orders, and then repaired to Constantinople, where his courage gained him the esteem of the Turks. Prompted by ambition, he became ungrateful to his first benefactor; and after bringing Bathori into bad odor with both the Transylvanians and the Turks, managed to make the latter declare war, and actually headed a Turkish army against him. His treachery was suc-

BETHNAL GREEN — BETROTHED

cessful and in 1613 he was proclaimed prince of Transylvania. Shortly after, having succeeded in stirring up the Hungarians against the Emperor Frederick II., he took several towns, and in 1618 assumed the title of king of Hungary. Thereafter, supported by Turks and Tartars, he entered Austrian territory, laid waste Moravia, hemmed in the imperial army, and was on the eve of gaining a complete victory when the refusal of the Turks to undergo a winter campaign defeated all his hopes. The approach of Tilly compelled him to withdraw, and he was glad to conclude a peace which deprived him of his Hungarian title, but left him in possession of his conquests. While preparing for a new war against the imperialists he died of dropsy. He is said to have participated in 42 battles.

Beth'nal Green, England, an eastern suburban district and parish of London, in Middlesex County, now forming a parliamentary borough, having two divisions with two members. In 1872 a branch of the South Kensington Museum was opened in the district.

Bethphage, bēth'fāj (Hebrew, house of figs), a place of Scriptural interest, of which no trace is left. Its name was significant of its general location, but not of the particular site. "The place of figs," it must have been situated somewhere on the eastern slope of that range of hills extending north and south between Jerusalem and Bethany, at the foot of which in the western valley flowed the Kedron. The principal points of this range are the Mount of Offence and the Mount of Olives. The fig-tree still abounds both on the eastern and western slopes of the range, and even beyond Bethany toward Jericho. Some travelers have been disposed to place Bethphage on the site of the modern village of Abu Dis, lying south, and a little to the east of Bethany. Robinson thought this could not have been its position, and gave little credit to the tradition of the monks of the country, who place it between Bethany and the summit of the Mount of Olives, since there is no trace that a village of any description ever existed there. Lightfoot thought it was a district extending from the Mount of Olives to Jerusalem, and embracing a village of the same name.

Bethsaida, bēth-sā'ī-da, a village on the west shore of the Lake of Galilee, the birthplace of Peter and Andrew and Philip. Its site has been identified with a heap of grass-grown ruins. At the northeast extremity of the lake was another Bethsaida, a village, near which the 5,000 were fed. Philip the Tetrarch raised it to the dignity of a town, and renamed it Julius, in honor of the Emperor Augustus' daughter.

Bethshemesh, bēth-shē'mēsh (Hebrew, house of the sun), a city of ancient Palestine, which probably occupied the site of the modern village, Ain Shems, about 15 miles west-southwest of Jerusalem, where extensive ruins are still remaining. The exploits of Samson were mainly in the neighborhood of Bethshemesh.

Bethune, bē-thoon', **Charles James Stewart**, Canadian educator: b. West Flamboro, Ont., 11 Aug. 1838. He was graduated at Trinity College, Toronto, in 1859; ordained deacon in the Church of England in 1861, and priest in 1862. He became incumbent of the Credit Mis-

sion in 1866, and in 1870 was appointed to the head mastership of Trinity College School, in Port Hope. He is well known as a writer on scientific subjects. He was the first editor of 'The Canadian Entomologist,' a monthly magazine. Resigning this place, he edited for a considerable time the entomological department of the *Canadian Farmer* and the *Weekly Globe*. In 1886 he again became editor of the 'Canadian Entomologist.' In 1892 he was elected a Fellow of the Royal Society of Canada.

Bethune, George Washington, American Dutch Reformed clergyman and poet: b. New York, 18 March 1805; d. Florence, Italy, 27 April 1862; was noted as an orator and a wit. He had charges at Rhinebeck, and Utica, N. Y., Philadelphia, Brooklyn, and New York city. Besides religious works, he wrote 'British Female Poets,' 'Lays of Love and Faith' (1847); several of the hymns in which are widely used. He also published an edition of Izaak Walton's 'Complete Angler' (1846); etc. See Life, by Van Nest (1867).

Bethuné, bâ-tûn, France, a town in the department of Pas de Calais, 19 miles north-northwest of Arras. It stands on a rock washed by the Brette, and is a place of considerable strength. The appearance of the town is not prepossessing. There is, however, one fine square, the centre of which is occupied by an ancient belfry of remarkable construction, while the hotel-de-ville, among the best edifices in the town, forms one of its sides. The chief manufactures are oil, soap, and cloth. There are also distilleries, tanneries, and salt and sugar refineries. The trade is greatly favored by the canals of Lawe and Bassée, which meet here. The family of the lords of Bethune is very celebrated, and a branch of it was established in Scotland about the end of the 12th century. To this branch the celebrated Cardinal Beaton belonged. Pop. about 15,000.

Betlis, or **Bitlis**, a town of Turkish Armenia, about 20 miles west from Lake Van. It is one of the most ancient cities of Kurdistan, situated in a wide ravine, traversed by a stream, on whose steep banks the town is built. The houses are of red stone, generally two stories in height, with grated windows to the streets. In the centre, on a high rock, is an ancient castle, formerly the residence of the khans of Betlis. The country around is fertile, well cultivated, and produces excellent crops of grain, cotton, hemp, rice, olives, tobacco of the best description, and excellent fruits and vegetables. The principal manufactures of the town are coarse cotton cloth and tobacco. Pop. about 30,000.

Betrothed, **The**. (1) A famous romance by Alessandro Manzoni — 'I Promessi Sposi.' It was its author's only romance, but it sufficed to place him at the head of the romantic school of literature in Europe. The scene of the story is laid within the country around Milan, and the plot concerns only the troubled and impeded but at last happily liberated course of true love between the humble peasant Renzo and his already betrothed Lucia. The religious motive of the book is sincere but not exaggerated, and never runs to fanaticism. Its original publication was in three volumes, and occupied two years, 1825-6, during which time it awakened a wide interest in European circles; and having been soon translated into all modern languages, it has become

BETROTHMENT — BETTERTON

probably the best known of all Italian romances to foreign readers. (2) A novel by Sir Walter Scott (1825), the scene of which is laid in the reign of Henry II. (3) An opera by Pelrella, first sung in 1869, at Lecco.

Betrothment, or **Betrothal**, a mutual promise or compact between two parties, by which they bind themselves to marry. The word imports giving one's troth, that is, true faith or promise. Formal ceremonies of betrothment are not the custom in the United States and Great Britain, as on the Continent, where the betrothment is either solemn (made in the face of the church), or private (made before witnesses out of the church). As betrothments are contracts, they are subject to the same rules as other contracts; for instance, that they are valid only between persons whose capacity is recognized by law; and the use of fraud, violence, or intimidation vitiates the contract. The consent of both parties, of course, is required. This may be expressed either verbally, or by writing, or by action. In Germany, the consent of the parents is always necessary, if the parties are under age, not yet *sui juris*. But if the parents withhold their consent unreasonably, the permission of the judge is allowed to sanction the contract. If the opinions of the parents are diverse, the law gives effect to that of the father. Betrothments contracted thus, according to law, are called *sponsalia publica*; others are called *sponsalia clandestina*. The latter are, in some places, utterly invalid; in others, only punishable. By the common German law, however, they are valid in every case in which consummation or consecration by the priest has taken place. The parents, in these cases, are not allowed to apply for a dissolution of the contract, nor can they refuse their consent, except for highly important reasons. Public betrothment induces the obligation to marry. In case of refusal to complete the contract by marriage, the injured party is allowed an action at law to compel its performance; but, since unhappy marriages are among the greatest misfortunes, the means of compulsion applied by the law are never great, amounting only to a small fine, or a short imprisonment. If circumstances take place which, if happening before the betrothment, would have necessarily prevented it, the party affected by them is allowed to recede from the engagement, and modern laws allow only an action for damages. In Germany, betrothment generally takes place in a small company of relations and friends. In Russia, it was once binding and indissoluble, like marriage, but is now a mere form accompanying the marriage ceremony. The contract is called by the Jews *thenaim rischonim*. In the laws of Moses there are certain provisions respecting the state of the virgin who is betrothed. Selden's 'Uxor Hebraica' gives the schedule of Hebrew contracts of betrothment. With the Jews, a young woman is rarely allowed to enter into an engagement without the cognizance of her relatives, who, in fact, in most cases, arrange matters for her, and generally avail themselves of the services of marriage brokers, who receive a percentage upon the amount of the dowry, beside a gratuity. In the continental cities these Jew marriage brokers have matches always on hand, with dowries varying from \$5,000 to \$200,000, and as soon as the betrothment has taken place they look upon the bargain as concluded; but cases frequently

occur, in which on the day of the wedding the bridegroom breaks the match because the Austrian metalliques or Spanish Ardoins, tendered in payment for the dowry, have fallen in value, and reduced the dowry perhaps to the extent of 20 or 25 per cent. Among the ancient Greeks, the father made a selection for his daughter. The young couple kissed each other for the first time in the presence of their friends, and it was customary for the bridegroom to bring flowers daily, until the wedding day, to the house of his bride. The Arab sends a relative to negotiate about his intended bride, and the price at which she is to be had. The bridegroom of Kamchatka has to serve in the house of his prospective father-in-law before an engagement is allowed to take place. With the Letts and Esthonians no engagement is considered valid until the parent and relatives of the bride have tasted of the brandy which the bridegroom presents. Among the Hottentots, the would-be bridegroom is not allowed to propose without being accompanied by his father. Father and son walk arm in arm, with pipes in their mouths, to the house of the bride, where the engagement takes place. Among some of the indigenous tribes of America it was customary to keep the betrothed lady in durance for 40 days, as the superstition prevailed that she would exert an occult influence upon any thing she touched or anybody with whom she came into contact. During these 40 days the lady was kept on starvation fare, so that when the day of the wedding came she looked more like a skeleton than like a bride. See Pollock and Maitland, 'History of English Law' (2d ed. 1899).

Betsy and I Are Out, the title of a popular American poem by Will Carleton (q.v.), first printed in the Toledo *Blade* in 1872.

Betteloni, bêt-tê-lôn'ne, **Vittorio**, Italian poet: b. Verona, 1840. He was educated in Pisa, and became professor of Italian literature and history in the Female College in Verona. His verse proves him an adherent of that Italian classical school which dates from 1869, and includes 'In the Springtime' (1869); 'New Stanzas' (1880); and a translation of Goethe's 'Herman and Dorothea.'

Betterton, Thomas, English actor: b. August 1635; d. London, 28 April 1710. He was the son of an under-cook in the service of Charles I., and was apprenticed to a bookseller in London. His master, Mr. Rhodes, obtained a license for a company of players in 1659, and with him Betterton commenced his career. He was engaged by Davenant in 1662. His position was soon pre-eminent, and he became an established favorite. He seems to have had no personal graces from nature to second his rare talents, if the following account be true: "Mr. Betterton, though a superlatively good actor, labored under an ill figure, being clumsily made, having a great head, a short, thick neck, stooped in the shoulders, and had fat, short arms, which he rarely lifted higher than his stomach. His left hand frequently lodged in his breast between his coat and waistcoat; while with his right he prepared his speech; his actions were few but just; he had little eyes and a broad face, a little pockfretten; a corpulent body, and thick legs, with large feet; he was better to meet than to follow, for his aspect was serious, venerable, and majestic. In his latter time, a little para-

lytic; his voice was low and grumbling, yet he could tune it by an artful climax which enforced universal attention even from the fops and orange girls. He was incapable of dancing even in a country dance, as was Mr. Barry, but their good qualities were more than equal to their deficiencies." Betterton had the rare faculty of identifying himself with his part. He married Mrs. Sanderson, an actress of almost equal merit with himself, whose Lady Macbeth was reckoned a perfect piece of acting. He was prudent and saving, but he lost his small means in a commercial speculation, and a theatre which he afterward opened was not successful. After his retirement from the stage, he reappeared in his old age a few times to take a benefit, his last appearance being 13 April 1710. He was buried in Westminster Abbey. See Howe, 'Thomas Betterton' (1891).

Bettinelli, bêt-te-něl'le, **Saverio**, Italian author: b. Mantua, 1718; d. 1808. He studied under the Jesuits; entered, in 1736, the novitiate of this order, and taught from 1739 to 1744, belles-lettres at Brescia, where he made himself known by some poems composed for the use of schools. In Bologna, where he studied theology, he continued to cultivate his poetical talents, and wrote for the theatre of the college his tragedy of Jonathan. In 1751 he was intrusted with the direction of the college of nobles at Parma. After the suppression of the Jesuits in 1773 he returned to his native city, where he resumed his literary labors. His chief work is his 'Risorgimento negli Studj, nelle Arti e ne' Costumi dopo il Mille' (1775). The 'Lettere dieci di Virgilio agli Arcadi' attracted great attention, and its criticism of the older poets, particularly Dante, involved him in many contests. The best of his poems are his 'Versi Sciolti,' which though they do not show any great poetical power, are always elegant and ingenious.

Betting, the staking or pledging of money or property upon a contingency or issue. The processes of betting may be best illustrated in connection with horse-racing, which furnishes the members of the betting fraternity with their best markets. Bettors are divided into two classes—the backers of horses, and the book-makers, or professional bettors, who form the betting ring, and make a living by betting against horses according to a methodical plan. By the method adopted by the professional bettor the element of chance is as far as possible removed from his transactions, so that he can calculate, with a reasonable prospect of having his calculations verified, on making more or less profit as the result of a season's engagements. Instead of backing any particular horse, the professional bettor lays the same sum against every horse that takes the field, or a certain number of them, and in doing so has usually to give odds, which are greater or less according to the estimate formed of the chance of success which each of the horses has on which the odds are given. In this way, while in the event of the race being won (as is usually the case) by any of the horses entered in the betting-book of a professional bettor, the latter has always a certain fixed sum (say \$1,000) to pay, he receives from the backers of the losers sums which vary in proportion to the odds given. Thus, if a book-maker is making a

\$1,000 book, and the odds against some horse is four to one, he will, if that horse wins, have to pay \$1,000, while, if it loses, he will receive \$250. It usually depends upon which horse it is that wins a race whether the book-maker gains or loses. If the first favorite wins it is evidently the worst thing that could happen for the book-maker, for as he is bound to receive the sum of the amounts to which all the horses except one have been backed, the largest deduction must be made from his total receipts on account of the first favorite. Very frequently the receipts of the book-maker are augmented by sums paid on account of horses which have been backed and never run at all. Sometimes, although not often, the odds are given upon and not against a particular horse. Books may also be made up on the principle of betting against any particular horse getting a place among the first three. The odds in this case are usually one fourth of the odds given against the same horse winning. Another mode of betting is that called a sweepstake, in which a number of persons join in contributing a certain stake, after which each of those taking part in the sweepstake has a horse assigned to him (usually by lot), which he backs, and the backer of the winning horse gains the whole stakes. If there are more persons taking part in the sweepstake than there are horses running some of them must draw blanks, in which case of course their stakes are at once lost.

At common law, wagers are not *per se*, void, but statutes prohibiting betting have been passed by many of the States. When one who loses a wager gets another to pay the money for him, an action lies for the recovery of the money. Wagers on the event of an election laid before the poll is open, or after it is closed, are illegal. In horse-racing, simple bets upon a race are unlawful both in England and the United States. In the case even of a legal wager, the authority of a stakeholder, like that of an arbitrator, may be rescinded by either party before the event happens. See **WAGER**.

Betts, Craven Langstroth, American poet and story writer: b. New Brunswick, 23 April 1853. Besides translating 'Songs from Béranger' in the original metres, he has written 'The Perfume Holder, a Persian Love Poem'; with A. W. H. Eaton, 'Tales of a Garrison Town'; and 'A Garland of Sonnets.'

Betts, Samuel Rossiter, American jurist: b. Richmond, Mass., 8 June 1787; d. New Haven, Conn., 2 Nov. 1868. He practised law in Sullivan County, N. Y.; served in the War of 1812 and first became prominent when appointed judge advocate. He was a member of Congress 1815-17; circuit court judge, 1823-6; and United States district judge, 1827-67. As codifier of the maritime laws of the United States he exercised a clarifying influence upon such questions as salvage, wages, charters, insurance, seamen's wages, etc., and the formulation of the neutrality and patent laws. He published 'Admiralty Practice' (1838).

Betty, William Henry West, English actor, better known as the **YOUNG ROSCIUS**: b. Shrewsbury, 1791; d. London, 24 Aug. 1874. His first appearance was in Belfast, at the age of 11, when he assumed the role of Osman in 'Zara,' and achieved an immediate success. For almost five years after this he played the most

BETULA — BEVERAGES

important parts before crowded and enthusiastic audiences, Pitt adjourning the House of Commons in 1805 on one occasion in order to permit members to witness the boy's Hamlet. He quitted the stage in 1808, but after studying for a while at Cambridge, returned to it in 1812, but failed to repeat his early triumphs. He retired finally in 1824, and lived for 50 years in the enjoyment of the fortune he had so early amassed.

Bet'ula, the generic name of birch (q.v.).

Bet'wa, a river in Hindustan, which takes its rise in the Vindhyan Mountains, near Bhopal, and flowing nearly 340 miles in a northerly direction through the provinces of Malwa and Allahabad, finally joins the Jumna below Kalpee. Near Erech a slight fall occurs. The country through which it flows is highly cultivated. The river at times is said to rise to a great height and in a portion of its course flows through beds of iron ore.

Beulah, bū'la, a region described in Bunyan's 'Pilgrim's Progress,' where there is nothing to annoy and all sounds are agreeable.

Beurnonville, bér-nōn-vēl, Marquis de (PIERRE DE RUEL, pē-ār de rū-ēl), marshal of France: b. Champignolle, Burgundy, 10 May 1752; d. 23 April 1821. Originally intended for the Church, he chose the profession of arms and served in the East until 1789, when he was sent home by the governor of the Isle of Bourbon, his temper being quarrelsome. Arriving in Paris at the commencement of the Revolution, he identified himself at once with it, and in 1792 was appointed aide-de-camp to Marshal Luckner, and was soon after named general-in-chief of the army of the Moselle; in 1793 he became minister of war. Sent in 1793 to arrest Dumouriez, he was himself arrested by Dumouriez, and confined at Ehrenbreitstein, Eger, and Olmütz, until 1795, when he was exchanged, and became successively general-in-chief of the army of the north, inspector-general of infantry, ambassador to Berlin in 1800, to Madrid in 1802, and count of the empire. In 1814 he was commissioned by Napoleon to organize means of defense upon the frontier, and on the emperor's abdication was named minister of state and peer of France by Louis XVIII. On the return of Napoleon to Elba, he was proscribed by a special decree, and retired again, but was reinstated in all his dignities by Louis XVIII. after the battle of Waterloo. He became marshal of France in 1816, and marquis in 1817.

Beust, Friedrich Ferdinand, boist, frē-drin fēr-dē-nānd (COUNT VON), Saxon and Austrian statesman: b. Dresden, 1809; d. 1886. He adopted the career of diplomacy, and as member of embassies or ambassador for Saxony resided at Berlin, Paris, Munich, and London. He was successively minister of foreign affairs and of the interior for Saxony. At the London conference regarding the Schleswig-Holstein difficulty he represented the German Bund. He lent his influence on the side of Austria against Prussia before the war of 1866, after which, finding his position in Saxony difficult, he entered the service of Austria as minister of foreign affairs, became president of the ministry, imperial chancellor, and in 1868 was created count. In 1871-8 he was ambassador in London, in 1878-82 in Paris.

Beutenmüller, boi'tēn-mül-lēr, William, American entomologist: b. Hoboken, N. J., 31 March 1864. Educated in the public schools, he became in 1889 curator of the department of entomology in the American Museum of Natural History. He has written a useful work on butterflies and moths, and contributed to scientific and popular magazines over 100 articles on entomology. He has been president of the New York Entomological Society, and is editor of its 'Journal.'

Beuthen, boi'tēn, Prussia, a town, province of Silesia, government of Oppeln, about two and a half miles from the Polish frontier. It has steam and electric tramways, and among buildings of note are the Roman Catholic Church of St. Mary (13th century), Protestant parish church (15th century), synagogue, royal Catholic gymnasium, higher girls' school, etc. It is an important centre of mining and metallurgy, having iron-works, zinc-works, lead-works, coal-mines, and various industrial establishments. Pop. about 48,000.

Bevedero, bā-vā-dā-rō, Argentina, a lake in the province of Mendoza, consisting of two distinct bodies of water, called the Greater and Lesser Bevedero, connected by a river about eight miles long. Greater Bevedero is 40 miles in length from north to south, and from 3 to 25 miles in width. Lesser Bevedero measures about 22 miles by 15. The lake lies between 32° 45' and 34° 17' S. lat. and 66° and 66° 32' W. lon.

Beveland, bā've-lānt, North and South, Netherlands, two islands in the province of Zealand, and formed by the mouths of the Scheldt. North Beveland lies east of the island of Walcheren, and is separated from South Beveland by the island of Wolfersdyke. South Beveland, the larger and more fertile, contains Goes, the capital, and several forts and villages. The united area of the islands is 120 square miles.

Beverages. Beverages are those drinks to which mankind resorts in order that he may relieve the pangs of thirst or supply some other demand of the system. In the beginning man's life was marked by its simplicity. Our first parents were content to eat the fruits that they found so convenient for their needs and it is doubtful if they knew any other beverage than the pure water coursing through the streams that irrigated the ground. It was not until they began to eat the flesh of beasts and searched the soil for delicacies to gratify their newly awakened appetite for a variety in foods that they felt the craving of unnatural thirst. But the eating of strong meats required the drinking of stronger drinks than water and in this fact we find the origin of the history of beverages.

It would be intensely interesting if we could know in just what way prehistoric man first satisfied his unnatural thirst for drink. It is, of course, more than probable that the second beverage discovered by man was the milk of the animals he slaughtered to gratify his taste for meat. From a temperate and hygienic point of view it was not a long stride from the waters of the brooks to the milk of cows and asses and yet it stands out as a landmark in the development of the demand for variety, the demand which may be regarded as the first tendency toward civilization. It is also quite probable that,

BEVERAGES

in the beginning, man drank his milk soon after it was drawn or while it was still fresh, but finally there came a day when some prehistoric investigator was bold enough to take a drink of the milk of mares that had been set aside, and from this fermented liquid learned the sensations of intoxication, for kumyss, still the favorite tippie of the Tartar, is unquestionably the most ancient of all intoxicating beverages.

To mankind, next to water, milk is still a favorite beverage, for it possesses the double advantage of being both food and drink. To the civilized taste the milk of cows is the most desirable but more barbaric taste calls for a stronger beverage and is best gratified by the milk of mares, asses, camels, or even rein-deers.

It is undoubtedly true that if we ate only wholesome foods in such quantities only as our system requires; performed our work with regularity; enjoyed, at proper intervals, requisite rest and recreation, and avoided all such deleterious distractions as excitement and worry, water would be the only beverage that nature would demand. Of course, it is unnecessary to state that such an ideal condition could scarcely obtain in these days of modern civilization, and, as the result, it is just as impossible to deny the fact that man sometimes demands a drink that will have a tendency to stimulate or refresh the jaded system.

While it is the primary object of all beverages to relieve thirst nearly all of them also possess other properties that exercise more or less effect upon the body. For example, those drinks which contain the largest quantities of water pass most rapidly into the circulation, increasing the volume of blood. Diluting the food, they not only assist digestion but also aid in eliminating waste matter from the body through the ordinary channels. There are beverages that soothe and beverages that irritate, but all have their purpose. The former find their scope of usefulness in times of fever and cold, while the latter are stimulating irritants of great medicinal value.

Among the most useful beverages are those that best relieve the cravings of thirst, the sour liquids prepared from the lemon, or other fruit juices, which, while perhaps not acid in themselves, have been rendered acidulous by charges of carbon dioxide. While the carbonated and mineral waters have the greatest effect in eliminating waste matter from the system they are not so useful in this regard as the hot drinks, like tea, coffee, or even hot water, for they not only play their part in the elimination of waste but also cool the body by increasing the perspiration.

Particularly soothing are such mucilaginous or gelatinous liquids as barley water, flaxseed tea, and Irish moss. The mineral waters, malt liquors and light wines act with a tonic effect; the more common beverages, like tea and coffee and the milder alcoholic liquors are stimulating to the nerves, while tea and coffee, if milk and sugar are added, as well as chocolate, cocoa and the malt liquors may be classified as the nutritive drinks.

Next in popularity to milk are those unfermented beverages which are made from products of the vegetable world such as tea, coffee, cocoa, and chocolate. Although cocoa is by far the most ancient of these drinks, having been

in use long before the stimulating qualities of either tea or coffee were discovered, coffee has long been in greatest demand. In fact, it has been estimated that about 500,000,000 people drink coffee daily, as against the 100,000,000 who drink tea, and the 60,000,000 who partake of chocolate and cocoa. In the United States alone some 500,000,000 pounds of coffee are consumed annually, as against 90,000,000 pounds of tea, and some 20,000,000 pounds of the various preparations of cocoa and chocolate.

There are several points of resemblance between all these table drinks, dissimilar as they are in appearance and flavor. In each case they exercise a stimulating effect, the caffeine of coffee and theine of tea being almost identical, while the theolonsine of chocolate and cocoa is but a slightly different principle. Each also contains the same bitter principle, tannin, and each owes its characteristic odor and flavor to an essential oil.

Coffee, which must be considered first, because of its great popularity, is the berry from the several species of the genus *Coffea*, of which *C. arabica* is the most important. First used in Abyssinia during the 9th century, it was later introduced into Arabia, and from there to Constantinople, where it had become popularized by the middle of the 16th century. It is supposed that it was Leonhard Rauwolf, a German physician, who introduced coffee into Europe in 1573. A few years later Prosper Alpinus brought some of the beans to Venice to use them as a drug, but it was many years before it was drank to any extent outside of Constantinople. In 1652, however, a coffee house was opened in London by the Greek servant of a merchant named Edwards, whose ships sailed to the Levant, and since that time the popularity of the beverage has never waned.

In its preparation as a drink coffee should not be boiled in water, but, instead, should be covered with water that has previously been boiled. Here it should be allowed to infuse for fully ten minutes, at a temperature little below the boiling point. As coffee does not contain as great a quantity of tannin as tea and does not yield it so readily, it may infuse longer without becoming bitter and indigestible, the effect which tannin exerts if it is boiled or left for too long a time over the fire.

Like many other beverages coffee exercises both good and evil effects upon the system. Stimulating the muscles, heart and nerves, its tendency is to overcome the ills of fatigue, while its strengthening effect upon the heart's action makes it a most valuable stimulant. At the same time its action upon the nervous system is so marked that over-indulgence in the drink is certain to be attended by such ill effects as insomnia, and nervous headaches, if not palpitation and general nervous disability.

Tea, which stands next to coffee as a table beverage, is a native of China where these shrubs of the *Camellia* family have been cultivated for more than a thousand years. It was once a general belief that there were many kinds of tea plants, but Robert Fortune, the botanist, exposed the myth by his thorough investigation of the various methods of cultivation and manufacture in use in the tea districts of China and India. It is now known, therefore, that while there are many variations in the tea plant, the varieties are all the same plant cultivated under

BEVERAGES

different conditions, while the two distinctive varieties, the green and the black tea, are the results of different methods of manufacture. Green tea, for example, is prepared by steaming the leaves before they have been rolled and dried, a method of procedure which produces a greater quantity of tannin.

As the flavor of tea as a beverage depends as much upon the quality of the water in which it is infused as upon the method of infusion, care should be taken to see that the water is neither too soft nor too hard, and that it has been well boiled before it is poured over the tea. The period of infusion, which is then continued at a lower temperature, should not last more than a few minutes, for the longer the infusion the greater the quantity of tannin that will be extracted.

Like coffee, tea has its good and evil effects. If infused too long it becomes bitter, unwholesome and indigestible. If drunk too freely it not only induces insomnia and kindred nervous disorders but irritates the stomach, producing a serious kind of catarrh. At the same time it is a mild stimulant which refreshes the body and prepares the brain for intellectual energy. It is also beneficial in aiding one to withstand the ill effects of cold, fatigue and hunger. By producing perspiration it cools the body when heated, and, by means of its action upon the heart, it warms the body when cold.

While tea has been consumed in China and other parts of Asia since the latter part of the 6th century it was not introduced in European countries for more than one thousand years. Pepys mentions having tasted it for the first time in 1660, but the novel beverage must have met with almost instant recognition for, less than 18 years later, it was in general use in every part of England.

As both cocoa and chocolate contain starch and fat in considerable quantities they are among the most nutritious of the stimulating table beverages. Both are obtained from a small evergreen tree, native to tropical countries, for while the cocoa of commerce is prepared by grinding the seeds themselves, the commercial chocolate cakes contain the better parts of the berry, usually mixed with sugar and some distinctive flavoring. The preparation of the drink is a simple process, the cocoa or chocolate merely being dissolved in milk and boiling water.

Although by no means so popular as tea or coffee the drinking of mineral waters has become so general during the past century that they must now be regarded as among the most important temperance beverages. Early in the 16th century an attempt was made to produce artificial mineral waters, but it was not until the 18th century that chemistry had made sufficient progress to enable the experimenters to prove the elementary compounds of the waters both as to quality and quantity. In fact, the first unqualified success in this line of investigation was made by Dr. Frederick Adolphus Augustus Struve, a Dresden druggist, who celebrated his achievement by opening an artificial mineral water pavilion in that city, in 1820.

The alkaline and mineral waters which are so much in use to-day owe their distinctive characteristics to the preponderance of carbonate and bicarbonate of sodium as well as to the carbonate of potassium, lithium, calcium and magnesium which they contain, all of which tend to make

them useful aids to the physician in the treatment of disease. The Vichy of France, for example, or the Ems of Germany, are extensively used in the dietetic treatments, correcting disorders of the stomach and acting as alkalizers of the blood, bile and urine. In cases of gout, gall stones, rheumatism, dyspepsia, constipation, etc., they have proved of invaluable service and have also been used successfully in the treatment of obesity. In many instances their value as medicinal agents is enhanced by the addition of carbon dioxide, while, in other cases, they are made more palatable and easy of digestion by being served with milk. Among the natural mineral waters produced in this country are those of Saratoga, N. Y., Saint Louis, Mich., and Waukesha, Wis., all of which are well and favorably known to those who make use of such beverages.

Another class of drinks, the popularity of which is beyond question, are those beverages which contain alcohol as an active principle: beer, ale, wine, cider, and the many kinds of spirituous liquors that are now manufactured in almost every part of the world. In addition to the alcohol these beverages also contain such properties as tannin, sugar, carbon dioxide, or various acidulous substances, any or all of which exert an influence over the flavor of the liquid. As to alcohol itself it has so long been a bone of contention that it would be folly to attempt to review a century-long contest in a single article. Originally used exclusively as a medicine, and admittedly a valuable agent in the treatment of certain diseases it is to be doubted if even the moderate use of such liquors as beverages is not productive of far more evil than good, while the effect of immoderate indulgence in such liquid stimulants is too well known to require further discussion. In spite of all the warnings of science, however, man continues to gratify his craving for alcoholic preparations. Even in countries where the ordinary beverages of commerce are unknown, savage taste has learned to delight in the flavor of fermented liquors, and this desire even the most barbaric people have had ingenuity enough to gratify.

Beer, or lager, as it is more generally known in this country, is by no means a modern invention and no drink has continued to maintain a more steadfast hold upon the taste of man since the earliest days of civilization. The Egyptians manufactured beer from barley many hundred years before the Christian Era. Archilochus, 700 B.C., shows that the Greeks had learned the art of brewing, while we have such eminent authorities as Sophocles and Æschylus, Diodorus and Pliny to prove that the Greeks and Romans both made beer and loved it. Like the Gauls, the Romans called it *Cerevisia*, from Ceres, the goddess of field fruits, and there is ample history to prove that the art of making this beverage was known to man fully as early as the art of making wine from the grape. Prior to the invasion by the Romans the Britons were drinkers of milk and water although they occasionally drank mead, an intoxicating beverage made from honey. As Tacitus tells us that beer was the ordinary drink of the Romans, and beer and vinegar the favorite beverage of the soldiers of Julius Cæsar, it is not difficult to imagine why, so soon after his invasion, the Britons became a nation of beer-drinkers. Unlike the Romans,

BEVERAGES

however, they employed wheat instead of barley in their malting. In Germany, too, beer was introduced at a very early date. Charlemagne loved it dearly and not only compelled the best brewers in the land to become attachés of his court, but gave his personal attention to the subject so conscientiously that he was able to tell them how to improve their brew. As early as 1482 the monasteries of that country began to make beer and, by the 16th century, that beverage had become one of the chief exports of the country. In fact, the German brewer has always been recognized as one of the best beer makers of the world and it has only been within the past century that the success of their Austrian rivals has had a tendency to somewhat eclipse their glory. Centuries ago beverages known as beer were made in England by tapping such trees as the birch, maple, spruce, and ash for their juices, or by resorting to the properties contained in ginger and other roots, a practice which not only still prevails in that country, but that was brought to America by the first colonists, who loved these humble, harmless drinks too well to leave their recipes in the motherland.

Ale and porter, the heavier malted liquors which are so much used in England and the United States, cannot boast such ancient lineage as beer, but still there is reason to believe that it was a beverage like ale on which the Anglo-Saxons and the Danes loved to become drunken, and, fully as early as the reign of Henry II., the monks of England had become famous for their wondrous brews. In fact, it was due to the investigations of some of these fathers of the monasteries that the superior quality of the waters of Burton-on-Trent for brewing purposes was discovered, a discovery that has made the ales and porters of England world celebrated.

Wine, whose history is as old as that of civilization, is the most aristocratic of drinks. Ascribed to the gods by the ancients—to Dionysus by the Greeks, Bacchus by the Romans and Osiris by the Egyptians—there can be no question but that the use of the juice of the grape as a beverage was one of the first discoveries of civilized man. It is true that the very ancient Romans did not know it at the time when even the Israelites had learned the secret of its production, but, later, wine-making in Rome became such a general enterprise that Emperor Domitian ordered half of the vineyards destroyed that the more necessary wheat might be raised in the place of the grape.

According to the best authorities Asia was the country in which the vine first grew without the aid of man, while Armenia and Eastern Pontus were the lands in which the cultivation of the grape was first undertaken. From there the love of wine spread rapidly through all the lands of ancient civilization. Among the best known Asiatic wines was that of Chalybon, near Damascus, the beverages with which the tables of the Persian kings were constantly supplied, while the most famous Greek wines came from such places as Chios and Lesbos.

In ancient India and in Egypt priests were forbidden to drink, while the Jewish priests were only forbidden on days of religious services. In fact, the Hebrews were by no means as strict about the use of the wine cup as were some other nations and the fact that vine-culture was one

of their favorite occupations is proved by history, both biblical and profane. Traditions state that it was the Phœnicians, the earliest of vine-growers, who carried the secret of wine making to Spain, Italy and France. They also established large vineyards on the islands of Chios, Mitylene and Tenedor.

As early as 550 B.C. the process of blending selected wines was known to the Carthaginians, while the ancient practice of adding turpentine to the wine for the purpose of preserving it was probably an invention of Italy. France, Spain, and Portugal are now the chief centres of vine-culture although the grape-growers in many parts of the United States, and particularly in the far Western States, have recently raised the making of wine to the dignity of a great American industry. Champagne, however, one of the most popular of wines, is a beverage of extremely modern invention when compared to other makes. Invented by Dom Perignon of Hautvillers about the beginning of the 18th century its use has become more and more general until it is now consumed by wine-lovers in all parts of the world. If wine is the most aristocratic, whiskey may be designated as the most democratic of drinks. Thoroughly cosmopolitan in character, in various countries it is distilled from various substances, but always, whether it is made from barley, corn, wheat, rye, or even from potatoes, it bears the same name and usually enjoys the same proportion of popularity. The word "whiskey" is a name that was bestowed upon this beverage by the Celts of Ireland and Scotland who began to make it about the middle of the 17th century. The word itself is a corruption of the Gaelic "uisge" (water), and closely interpreted means "strong water." In the beginning this drink was used almost exclusively as medicine but as soon as it had become introduced as a beverage it became a favorite drink throughout Great Britain, and while the word "whiskey" once referred only to the Scotch and Irish drinks of that name, the rye and Bourbon whiskeys of American manufacture are now consumed almost as generally as those made from recipes that have been handed down from the days of the ancient Celts.

Almost as strong as whiskey, brandy, the "brandy-vin" or burnt wine, is a drink which is often used, both for medicinal purposes and as a beverage. Its name, as is indicated, was derived from the method of its manufacture, a formula for liquor making that has been followed for many generations and in many parts of the world. In Morocco the Jews use the refuse of the grape as well as such fruits as raisins, figs, dates and pears in its distillation, and they have become strongly attached to their strange drink because they believe that their freedom from that terrible disease, elephantiasis, always so common among the Mohammedans in that country, is due to the fact that they partake so freely of this unique spirit. Molière, in his travels, discovered a tribe on the Barbary coast which made excellent brandy from honey; in Persia it is the lees of the weaker sorts of wines that are distilled, and almost every country has its particular method of making this beverage. None of them, however, can compare in quality to the cognac of France, that rich distillation from wines which alone properly bears the name of "brandy."

Gin is another distilled liquor. It is made

BEVERIDGE

from rye, grain and malted barley, flavored with juniper-berries and sometimes with turpentine. It is also known as Hollands, and as Holland gin, these names being a relic of the days when the beverage was called Holland-Geneva, the word "gin" being a corruption of the word "Geneva." Although originally made in Holland it was soon introduced into England where it immediately became one of the most popular of drinks. Easily manufactured and always strong it could be sold so cheaply that it was finally found necessary to adopt strict legislative measures restricting its sale and consumption. Hogarth's horrible picture, 'Gin Lane,' which was one of the influences in bringing about the much needed reform, is said to have been but slightly an exaggeration of the actual conditions which existed in all the large English cities during the reign of gin.

Rum, formerly spelled as the French still spell it, "rhum," is a spirit which is distilled from the sugarcane juice, from the skimmings of the juice from the boiling house, or from the molasses mixed with the lees of former distillations. Although not so commonly used as some of the other strong liquors rum has been known both for its medicinal value and as a beverage ever since its introduction from the West Indies, more than a century ago.

The following are among the drinks which are not so generally known but which are in common use among the people of other countries:

Arrack, a drink manufactured widely in the East and West Indies, is much used by the natives. In making it it is sometimes distilled from the fermented juice of the palm tree, and sometimes from a combination of rice and molasses used in connection with the palm-tree juices.

Vodka, which is the chief source of intoxication in Russia, is a liquor which may be distilled either from rye or from potatoes.

In several parts of the world the sap of trees is called into requisition to satisfy the thirst for intoxicants. Pulque, for example, the beverage most commonly used in all Spanish-American countries, is made from the fermented sap of the aloe, while a somewhat different drink, called Tepache, is made by mixing sugar and water with this sap of the aloe, which afterward is allowed to ferment for a few hours only. In Tasmania the so-called "cider-tree" furnishes the bushmen with a means of intoxication. In this case the sap is of such a character that it may be drank as soon as it is drawn from the tree, in which state it is both refreshing and harmless, but when it is allowed to stand for some time it becomes an intoxicant of great potency.

The Soma of the Hindus is supposed by some to have been the original intoxicant of the human race. The Persians, who accept this tradition, revere the beverage as Haoma, while in India it is looked upon as the beverage of the mighty god, ever-giving new strength and new vigor. It is a milky fluid which is found in the climbing bindweed, and, when properly fermented, is extremely "heady."

Sake, the commonly used distilled liquor of Japan, is made entirely from rice, as also is Samshée, a drink used by the lower classes in China.

Kvass is the name of a sour beer much fa-

vored by the Russian peasantry. It is made from barley and rye, by a similar malting process as that applied to the manufacture of beer.

The natives of South America have a drink which they call Guarapo, which is made from the fermented juice of the sugarcane.

Chi-chi is the name of a peculiar kind of cider which is made by the natives of Patagonia. In brewing it, in the autumn when the apples are ripe, they dig large pits which they line and interline most carefully with hides in order that none of the juice may soak into the earth. Into these hides they throw the ripe apples which are left to decay and ferment until they are ready for use. It is then extremely intoxicating.

A drink called Kephir is drunk by the natives of the Caucasus. It is an effervescing milk-like liquid, the effervescence being caused by the introduction of horny, yellowish-brown masses called "Kephir-grains." Kern, who made a scientific examination of these grains, discovered that they were made of a rod-like bacterium and a yeast-like substance that was entirely unknown to him. Not unlike Kumyss in appearance and in taste, Kephir is far more intoxicating.

Kava, or ava, is a Polynesian drink which is made by macerating in water a portion of the root and stem of one of the piperacæ.

There are several substitutes for tea in use in various parts of the world. In some of the Pacific Islands there are "tea-trees," while the natives of Tibet are very fond of their "brick tea," which is made from the offscourings and dust of the leaves and stems of the tea plants. It derives its name from the fact that the dust is pressed into hard, solid brick-shaped lumps, from which pieces are chipped off as they are to be used.

MILES BRADFORD,
Author of 'Carlotta and I.'

Beveridge, Albert Jeremiah, American lawyer: b. Highland County, Ohio, 6 Oct. 1862. He was brought up on a farm; graduated at De Pauw University; and engaged in law practice in Indianapolis. He entered political life in 1883, and soon won a reputation as an effective orator. On 17 Jan. 1899, he was elected United States senator for Indiana, as a Republican. Soon after his election he went to the Philippine Islands; made a thorough study of political and material conditions there; and, on the assembly of Congress in December following, delivered a thrilling speech in the Senate in support of the administration's policy concerning the new possessions in the East.

Beveridge, Kühne (COGHLAN), American sculptor: b. Springfield, Ill., 31 Oct. 1877. She studied under Rodin in Paris and O'Donovan in New York, and in 1893 married Charles Coghlan. Her works have been exhibited in New York, London, and Paris. She obtained honorable mention at the Paris Exposition of 1900.

Beveridge, William, English divine: b. Barrow, Leicestershire, 1637; d. Westminster, 1708. He studied at St. John's College, Cambridge, devoting his attention particularly to Oriental literature. In 1658 he published a work on Eastern tongues, especially Hebrew, Chaldee, Syriac, Arabic, and Samaritan, accom-

BEVERLEY — BEVIS

panied with a Syriac grammar. In 1660 he took orders, and obtained the vicarage of Ealing in Middlesex, where he wrote a useful 'Introduction to Chronology.' In 1672 he was appointed to the rectory of St. Peter, Cornhill, London, and the same year published his 'Synodicon' in two folio volumes, containing the Apostolic canons, decrees of the councils received by the Greek Church, and the canonical epistles of the early Fathers. This work called forth an opponent, to whom Beveridge replied in a 'Vindication.' In 1674 he obtained a prebend in St. Paul's, and in 1681 was appointed archdeacon of Colchester. In 1684 he became prebendary of Canterbury, and in 1688 was appointed chaplain to William and Mary. Shortly after, the see of Bath and Wells was offered him; but as it had become vacant by the conscientious refusal of Bishop Ken to take the new oaths, Beveridge, to his honor, declined to accept it. The episcopal dignity, however, was only delayed; in 1704 he became bishop of St. Asaph. Among his best-known works are 'The Church Catechism Explained'; 'Private Thoughts upon a Christian Life'; and 'The Great Necessity and Advantage of Public Prayer and Frequent Communion.' Collective editions of his works were published in 1824 and in 1842-6.

Beverley, Saint John of, English divine: b. about the middle of the 7th century at Harpham, Yorkshire; d. Beverley, 721. He was educated at Canterbury under Archbishop Theodore, and became a monk under Hilda in the monastery founded by her at Whitby. In 687 he was appointed to the see of Hexham, and in 705 was transferred to York. He founded a convent of nuns at Beverley, and built the choir of the church there. He resigned his bishopric and retired to Beverley in 718. Bede, who is said to have been his pupil, speaks of him with great veneration. He was canonized in 1037, and his remains were placed in a costly shrine, in Beverley minster. His fame was so widespread that when William the Conqueror led his army to the north and ravaged the country he saved the town of Beverley out of respect to the memory of the bishop. In 1416 Archbishop Chicheley ordered the anniversary of his death to be celebrated as one of the festivals of the Church, and special privileges were conferred on his church at Beverley by several English sovereigns. He is said to have written an 'Exposition of Luke' and 'Homilies on the Gospels.'

Beverley, Constance de, in Scott's poem 'Marmion,' a nun who for love of Marmion follows him in the disguise of a groom, and on being thrown over by Marmion is immured at Holy Isle for breach of her vow of chastity.

Beverley, Robert, American historian: b. Virginia, 1675; d. 1716. He was educated in England and about 1697 became clerk of the Council of Virginia and had charge of the records of the colony. He was the author of a 'History of the Present State of Virginia,' published in 1705, a most interesting account of the details of the daily life in colonial Virginia. A reprint was published in Richmond in 1855.

Beverley, England, a municipal borough and capital of the East Riding of Yorkshire, 20 miles east-southeast from York and a mile from the river Hull. It stands on the eastern edge of the Wolds, and on a branch of the

Northeastern Railway, and consists of a principal street above a mile in length, and several minor streets, all spacious and tolerably well built. Its most remarkable edifice is the minster of St. John, in the Decorated and Perpendicular English styles, and one of the finest specimens of ecclesiastical architecture in the kingdom, its west front in the opinion of excellent authorities surpassing in magnificence that of York minster. Other churches are St. Mary's and St. Nicholas'. Among the other chief buildings are the guildhall and corn exchange. The chief manufactures are leather, iron castings, agricultural implements, whiting, linseed oil and cake, manures, wagons, cement, and ale. Its environs abound with beautiful walks. It sent two members to Parliament till disfranchised in 1870. Pop. about 14,000. See Hiatt, 'Beverley Minster' (1900).

Beverly, Mass., a city in Essex County, on the Boston & M. R.R.; two miles north of Salem. It was founded 14 Oct. 1668; was incorporated as a city 23 March 1894; contains several villages; and is connected by trolley lines with Salem, Peabody, Gloucester, and Wrentham. It is the seat of the New England Institute for the Deaf and Dumb; is principally engaged in the manufacture of women's boots and shoes, and leather; has considerable shipping and fishery interests; contains high and graded schools, a public library, a national bank, a number of handsome residences belonging to Boston business men; and has a property valuation exceeding \$16,000,000. Pop. (1910) 18,650.

Beverly Farms, a name given to the eastern portion of the town of Beverly, Mass. It is a favorite summer residence for wealthy Bostonians and contains many beautiful mansions and park-like estates. In recent years it has endeavored to secure incorporation as a separate town.

Beverly's Ford, Va., scene of a sharp cavalry fight during the Civil War, between Buford, Pleasanton, and Gregg, commanding 9,000 Federals, and Stuart leading 12,000 Confederates. Hooker had sent Pleasanton to find Stuart, who was said to be near Beverly's Ford. Pleasanton planned to surprise the Confederates, but his plan miscarried. Stuart was fully prepared for him. Pleasanton was badly beaten. This action is also known as the battle of Brandy Station.

Bevis of Hampton, Sir, a legendary English knight who has been made the hero of mediæval romances by both English and Continental writers. He was the son of Sir Guy, Earl of Hamtoun, who was treacherously murdered by Divoun, emperor of Almayne, he was given by his false mother to some heathen merchants to be sold for a slave among the Paynim. By them he was carried to Ermony, where he soon became dear to King Ermyne, and dearer still to his only daughter, the lovely Josian. His chief exploits were the overthrow of Brademond of Damascus, of a monstrous boar, of the giant Ascapard, whom he spared to become his squire, and of a dreadful dragon near Cologne. His famous sword 'Morglay' he won in battle; his horse 'Arundel' was the gift of Josian. Still more romantic episodes in his story are his carrying his own death-warrant in a sealed letter to the vassal Brademond; his escape from his noisome dungeon after seven years' imprisonment; and recovery of his wife,

who had preserved his love, though nominally the wife of King Ynor of Mombraunt. He next returned to England to avenge his father's death, then sailed for Ermony and defeated Ynor in a desperate battle. His last great fight was in the streets of London, when he slaughtered 60,000 citizens and forced King Edgar to grant him terms. Thirty-three years he then spent in love and perfect happiness at Ermony, dying at the same moment as his wife, while his famous steed Arundel had died just before. The romance was edited by Dr. E. Kölbing for the Early English Text Society in 1885.

Bewick, bū'k, Thomas, English wood-engraver: b. Cherryburn, Northumberland, 12 Aug. 1753; d. Gateshead, 8 Nov. 1828. He early showed a great talent for drawing, and was apprenticed to an engraver in Newcastle. The celebrated Dr. Hutton, of Woolwich, then a schoolmaster in Newcastle, was preparing his great work on mensuration, and having employed Bewick's master in getting up the woodcuts for illustrating it, the execution of these was entrusted to the young apprentice. Bewick performed the work so admirably that his master advised him to turn his attention to wood-engraving, and accordingly with this view he proceeded to London. He returned, however, to Newcastle after a short time, and established himself there in partnership with his former master. His turn of mind led him to the study of natural objects, more especially animals; and in 1790 appeared his 'History of Quadrupeds,' the beauty of the illustrations of which attracted universal attention, so superior were they to anything hitherto produced by the art of wood-engraving. In 1797 appeared the first, and in 1804 the second volume of his 'British Birds,' generally regarded as the finest of his works. Bewick has never been surpassed in his spirited delineations of animals, and the admirable naturalness with which the accessories and backgrounds of the drawings, such as foliage, grass, and other rural objects, are represented. The tail-pieces to chapters throughout his works are of the highest excellence, and often display a rich vein of humor. His illustrated edition of 'Æsop's Fables' appeared in 1818. See Clement, 'Painters, Sculptors, Architects, and Engravers' (Boston, 1899); Dobson, 'Thomas Bewick and His Pupils'; Tytler, 'Modern Painters.'

Bewley, Anthony, American abolitionist b. Tennessee, 22 May 1804; d. Fort Worth, Texas, 13 Sept. 1860. A Methodist clergyman opposed to slavery, in 1858 he was driven from Texas for preaching according to his convictions. Against the advice of friends he returned in 1860, but remained only a few weeks, being again obliged to flee for his life. A reward of \$1,000 was offered for his apprehension; he was seized in Missouri, carried to Fort Worth, and there hung by the mob, the only reason for whose act was that he had maintained human slavery to be unjust.

Bey, bā, among the Turks, signifies a governor of a town, seaport, or small district. The Turks write the word *beg* (q.v.).

Beyer, bi-ēr, Samuel Walker, American geologist: b. Clearfield, Pa., 15 May 1865. He graduated at Iowa State College, 1889, and at Johns Hopkins University 1895. He is professor of geology and mining engineering in Iowa

State College. As special assistant on the Iowa Geological Survey he has prepared reports on the geology of Boone, Marshall, Story, and Hardin counties, and annual reports on the mineral productions of the State. In 1897 he was a delegate to the International Geologic Congress at St. Petersburg.

Beyle, Marie-Henri, bāl, mā-rē-ōn-re (pseudonym DE STENDHAL), French author: b. Grenoble, 23 Jan. 1783; d. 23 March 1842. He held civil and military appointments under the empire; took part in the Russian campaign of 1812; thence until 1821 lived at Milan, chiefly occupied with works on music and painting. After nine years' residence at Paris he became in 1830 consul at Trieste, and in 1833 at Civita Vecchia. In 1841 he returned to Paris, where he died. The distinguishing feature of his works was the application of acutely analytic faculties to sentiment in all its varieties, his best books being the treatise 'On Love' (1822); 'The Red and the Black' (1830); 'History of Painting in Italy' (1817); 'Racine and Shakespeare' (1827); and 'Life of Napoleon,' etc. A collective edition of his works appeared in 18 volumes in 1855-6, and his 'Correspondance Inédite' in two volumes in 1855.

Beyrout. See BEIRUT.

Beza, bē'zā, or de Bèze, dē bāz, Theodore, Calvinistic divine: b. of a noble family at Vezelay, in Burgundy, 24 June 1519; d. 13 Oct. 1605. He was educated in Orleans under Melchior Volmar, a German philologist devoted to the Reformation; and, early familiar with the ancient classical literature, he became known at the age of 20 years as a Latin poet, by his petulant and witty 'Juvenilia' (a collection of poems of which he was afterward ashamed). In 1539 he was made a licentiate of law, and went to Paris. He received from his uncle the reversion of his valuable abbey Froidmont, and lived on the income of two benefices and on property which he inherited from a brother. His habits were dissipated, but a clandestine marriage in 1543 recalled him from his excesses, and a dangerous illness confirming the intention which he had formed at Orléans of devoting himself to the service of the Reformed Church, he went to Geneva with his wife in 1547. Soon after he accepted a Greek professorship at Lausanne. During his 10 years in this office he wrote a tragic-comic drama in French, 'The Sacrifice of Abraham,'—which was received with much approbation; delivered lectures (which were numerous attended) on the Epistle to the Romans and the Epistles of Peter (which served as the basis of his Latin translation of the New Testament, of which he afterward published several editions); finished Marot's translation of the Psalms in French verse; and obtained to such a degree the confidence of the Swiss Calvinists that he was sent in 1558 on an embassy to the Protestant princes of Germany to obtain their intercession at the French court for the release of the Huguenots imprisoned in Paris. In the following year he went to Geneva as a preacher, and soon after became a professor of theology and the most active assistant of Calvin, to whom he had already recommended himself by several works, in which many of the views of that eminent theologian were advocated with great zeal and no small measure of ability, so that he was generally regarded as Calvin's ablest

BEZA'S CODEX—BHADRINATH

coadjutor, and the person destined to be his successor. His talents for negotiation were now often put in requisition by the Calvinists. He was sent to the court of Anthony, king of Navarre, at Nerac, to obtain toleration for the French Huguenots; and at his desire he appeared, 1561, at the religious conference at Poissy, where he spoke in behalf of his party with a boldness, presence of mind, and energy which gained him the esteem of the French court. He often preached in Paris before the queen of Navarre and the Prince of Condé; also in the suburbs. At the conference of St. Germain, in 1562, he spoke strongly against the worship of images, and after the commencement of the civil war accompanied the Prince of Condé as chaplain, and on the capture of the prince joined Admiral Coligny. After the restoration of peace he returned to Geneva in 1563, where, besides discharging the duties of his offices, he continued to engage in theological controversies in support of the Calvinists; and after Calvin's death in 1564 became his successor, and was considered the first theologian of this Church. He presided in the synods of the French Calvinists at La Rochelle (1571) and at Nismes (1572), where he opposed Morel's proposal for the alteration of clerical discipline; was sent by Condé (1574) to the court of the Elector Palatine; and at the religious conference at Montpellier (1586) opposed the theologians at Würtemberg, particularly James Andreas. At the age of 69 years he married his second wife (1588), and still continued to repel, with the power of truth and wit, the attacks and calumnies which his enemies, apostatized Calvinists (such as Bolsec), Lutherans, and Jesuits, heaped upon him. They reported in 1597 that he had died, and returned before his death to the Roman Catholic faith. Beza, now 78 years old, met his assailants in a poem full of youthful enthusiasm, and resisted in the same year the attempts of St. Francis de Sales to convert him, and the alluring offers of the Pope. In 1600 he visited Henry IV. in the territory of Geneva, who presented him with 500 ducats. Among his many works, his exegetic writings, and the able and correct 'History of Calvinism in France from 1521 to 1563,' which is ascribed to him, are still much esteemed. Beza's name is associated with the Codex which he presented to the University of Cambridge, for an account of which see BIBLE.

Beza's Codex. See BIBLE.

Bez'ant, a round, flat piece of pure gold, without any impression, supposed to have been at one time the current coin of Byzantium. Bezants are frequently employed as one of the charges in heraldry, a custom supposed to have been introduced by the Crusaders. Its value was about \$2.

Beziers, bâ-zê-a, France, a town in the department of Hérault, 38 miles southwest of Montpellier; situated on a height above the Orb, and on the Canal du Midi, a few miles from the Mediterranean, to which there runs a tramway line. It is surrounded by old walls, and though its streets are narrow, it is tolerably well built. Its most conspicuous edifice is the cathedral, a Gothic structure, crowning the height on which the town stands, and possessing a fine semicircular choir surrounded by columns of red marble. The city has a communal col-

lege, a museum, a library, and a society of economics and archaeology. Its manufactures consist chiefly of woollens, silks, hosiery, chemicals, spirits, etc. In 1209 it was the scene of a horrible massacre of the Albigenses by Simon de Montfort, in which 20,000 persons were killed. Pop. about 53,000.

Bezique, a card game which crystallized into official form in 1887. Two packs of cards are used, two players participate and the cards rank, ace high, then ten, king, queen, knave, nine, eight, and seven. All cards below that are discarded from both packs. Eight cards are dealt to each player. Trumps may be determined either by turning up the first card of the stack or by the suit of the first marriage. The non-dealer leads for the first trick, and the winner of each trick has the succeeding lead. After each trick, each player draws one card from the top of the stack, the winner of the trick taking the top card. The playing is as in whist, the leader taking the trick unless his opponent plays a higher card of the same suit or a trump. It is not necessary to follow suit until the stack is exhausted, when one must do so and take each trick, if possible. Counting is done by means of the values of the cards; each ace or ten-spot taken in a trick counts 10, the winner of the last trick of each hand scores 10, and if the trump is turned, both sevens count 10 for the turner, and if one exchanges from his hand a seven of trumps for another turned trump or if one declares the other seven of trumps 10 more is scored. The game is won by the player who first makes 1,000 points, and if his opponent has not made 500 the game counts double. There are certain combinations of cards other than the above, which, when declared, count as follows: Double bezique (both queens of spades and both knaves of diamonds) 500; sequence of five highest trumps, 250; and 4 aces, 100; any 4 kings, 80; any 4 queens, 60; any 4 knaves, 40; bezique (queen of spades and knave of diamonds), 40; royal marriage (king and queen of trumps), 40; marriage (king and queen of same suit), 20. A declaration is made by placing the declared cards face up on the table where they remain till played or the stack is exhausted, except in the case of the seven of trumps. To score, a declaration can only be made after winning a trick and before drawing, and but one declaration can be made at a time. After a card has been used in one combination it may be used to form another, excepting when used to form an equal or inferior combination in the same class as before. A player need not declare a combination which he holds and only before the stack has been exhausted can a declaration be made. Consult: A. Howard Cady's treatise, for details and rules.

Bezo'ar, concretions found in the fourth stomach of many of the *herbivora*, notably goats, at one time held in high repute because of fancied miraculous healing properties.

Bhadrinath, bhâ-dri-nâth', a town in northern Hindustan, on the Bishengunga, celebrated for its temple of Vishnu, with a hot mineral spring in whose waters both sexes bathe indiscriminately, to wash away their sins. Some 50,000 pilgrims visit the place annually. The temple has been frequently overthrown by earthquakes. The principal idol is a figure of black

BHAGALPUR—BHILS

marble, clothed in gold and silver brocade while the season of pilgrimage lasts, and then stripped and stowed away in a vault the rest of the year. The Hindus believe that in the neighboring mountains some holy anchorites have lived for several thousand years. Their place of habitation is a cavern perpetually choked with snow, which forbids the approach of the curious and the skeptical. The Bhadrinath peaks in the neighborhood are above 22,000 feet high.

Bhagalpur, b'hā-gāl-poor', a city of Hindustan, in Bengal, capital of a district and division of the same name, situated on the Ganges, 113 miles northwest of Moorshedabad. In the town and neighborhood are some interesting Mohammedan shrines; and there are here also two monuments, one erected (in 1780) by natives, and the other erected by government in memory of Augustus Cleveland, the conciliator of the formerly turbulent and marauding hill tribes of Sonthals. There are several indigo works in the neighborhood. Pop. about 75,275. The division of Bhagalpur lies between that of Rajshahi on the east and that of Patna on the west. It has an area of 20,511 square miles. Pop. about 8,721,484. The district of Bhagalpur is fertile, well watered, and highly cultivated. It is divided into two unequal portions by the Ganges. Area, 4,226 square miles; pop. about 2,088,560.

Bhagavadgita, bhā'gā-vād-gē'ta (Sanskrit, the Divine Song), the title of a religious-philosophical didactic poem interwoven as an episode in the great Indian epic of the Mahābhārata (q.v.).

Bhamo, bha-mō', India, a town of Burma, on the Upper Irrawaddy, about 40 miles from the Chinese frontier, and 180 north-northwest of Mandalay, with which it has railway communication. About 20 miles above Bhamo the river suddenly narrows from 1,000 to 150 yards and flows through a rocky gorge subject to eddies and back-waters. Navigation is at that point very difficult, and at times impossible. Bhamo is the starting-point of caravans to Yunnan, and will become one of the great emporiums of the East in the event of a regular overland trade being established between India and Western China. Pop. (estimated) about 7,000.

Bhang, bāng, an Eastern name for hemp (*Cannabis Indica*) (q.v.).

Bhartpur, bhārt-poor', or **Bhurlpore**. (1) A native state of India with an area of 1,961 square miles. The surface is generally low and the state is scantily supplied with water; soil generally light and sandy; chief productions, corn, cotton, sugar, and salt. It has been under British protection since 1826. Pop. about 626,000.

(2) A town, the capital of the above state, on an extensive and fertile plain, 110 miles southwest of Delhi. It covers an area about four miles in circuit, and was so strongly fortified that in 1805 it stood a siege by Lord Lake of 14 weeks, and cost the besiegers 3,100 men. In a second siege, in 1826, its resistance to Lord Combermere was less successful. The fortifications have been demolished, but the fort still exists, and is enclosed by a wet ditch and a wall of hewn stone, which taken together are 60 feet high. Within the fort is the rajah's palace, built of red and yellow freestone in the

Mogul style, and picturesquely crowning an eminence surrounded by flower-gardens and fountains.

Bhartrihari, bhār-tre-hā're, Indian poet, author of a book of apothegms. According to the legend he was the brother of King Vikramāditya, who lived in the 1st century B.C. The collection of 300 apothegms (short poems) bearing his name present us with graceful descriptions of nature, charming pictures of love, shrewd remarks on everyday life, and profound thoughts on the Deity and the immortality of the soul. Bhartrihari was the first Indian writer who became known in Europe, 200 of the apothegms having been translated by the missionary Abraham Roger and published at Leyden (1653). His actual personality has been much discussed without any very satisfactory conclusion having been reached. The weight of opinion inclines to belief in his existence, and that he was a poet of a philosophical cast, possibly a grammarian also, and very likely of royal descent. See Von Bohlen, 'Bhartrihari's Sententiæ' (1833); Tawney, 'Two Centuries of Bhartrihari' (1877); Wortham, 'Translation of the Satakas of Bhartrihari' (1886); More, 'A Century of Indian Epigrams, Chiefly from the Sanskrit of Bhartrihari' (1898); Kale and Gurjar, 'Nīsitakā and Vairagysatakā, with Notes and an English Translation' (1898).

Bhatti, bhāt'te, Indian epic poet of the 6th or the 7th century. His poem, named after him, 'Bhattikāvya,' is in 22 cantos. Its theme is the deeds of Rāma; but the author designed the work to be also an exemplification of the rules of grammatical and rhetorical composition. It was published with a two-fold commentary at Calcutta (1828).

Bhavabhūti, bhā-va-bhoo'te, surnamed ŚRĪ-KANTHA, Indian dramatist, of the first half of the 8th century. He wrote at least three plays, the 'Mahāvīracharita' ('life of the great hero'), and the 'Uttararāmcharita' ('later life of Rāma'), forming together, in seven acts each, a dramatized version of the story of the Ramayana; and the 'Mālātī-mādhava,' a domestic drama in ten acts, full of life and incident. Bhavabhūti is often compared with Kālidāsa, whom he equaled in vigor and variety, but hardly in genius. All three plays have been translated into English. See Levi, 'Le théâtre indien' (1890).

Bhawalpur, bhā-wal-poor', or **Bahawalpur**, a state of the Punjab, British India, south of the Indus and Sutlej rivers. It is chiefly a desert of shifting sand. Only the river banks are cultivable. The inhabitants are Jāts, Baluchis, and Afghans, the greater part Mohammedans. Area, 17,285 square miles. Pop. about 720,000. Bhawalpur, the capital, is on a branch of the Sutlej. It is enclosed by gardens and mud walls, four miles in circumference; noted for the manufacture of a kind of turban and scarf very popular among the Hindus; also produces considerable woolen, silk, and cotton cloth, indigo, alum, and saltpetre. Pop. 14,000.

Bhils, bēls, or **Bheels**, a Dravidic race inhabiting the Vindhya, Satpura, and Satmala Hills, a relic of the Indian aborigines driven from the plains by the Aryan Rajputs. They appear to have been orderly and industrious under the Delhi emperors; but on the transfer

of the power in the 18th century from the Moguls to the Marathas they asserted their independence, and being treated as outlaws took to the hills. Various attempts to subdue them were made by the Gaekwar and by the British in 1818 without success. A body of them was, however, subsequently reclaimed, and a Bheel corps formed, which stormed the retreats of the rest of the race and reduced them to comparative order. The hill Bheels wear little clothing, and live precariously on grain, wild roots, and fruits, vermin, etc., but the lowland Bheels are in many respects Hinduized. Their total numbers are about 750,000. See Rowney, 'Wild Tribes of India' (1882); Reclus, 'Primitive Folk' (1891).

Bhilsa, bēl-sā, or **Bilsa**, a town of Hindustan, on the Betwa, 280 miles southwest of Allahabad. It has a fort enclosed by a ditch and a stone wall surmounted by square towers, and is a place of Hindu pilgrimage. One of the curiosities of the place is a brass gun measuring 19½ feet in length, with a bore of 10 inches; elegantly proportioned, highly ornamented, and said to have been made by order of the Mogul emperor, Jehangir. Fine tobacco is produced in the vicinity. In the neighborhood are some very large and remarkable ancient Buddhist monuments known as *topes*, one of the principal being a dome-shaped structure 70 or 80 feet in height. Pop. about 9,700.

Bhima, bē'ma, **Beemah**, or **Bimah**, (1) a god in Hindu mythology, the son of Pritha (or Kunti) by Vayu, the god of the wind, remarkable for his great size and strength; (2) the name of a river of India rising in the Poona district of Bombay and flowing southeast to the Kistnah River, about 400 miles in length.

Bhiwana, bhe-wā'ne, a town of India in the Punjab, district of Hissar. It is the trading centre of its district, exporting metals, sugar, and spices. Pop. 35,000.

Bhopal, bhō-pāl'. 1. A native State of central India, with an area of 6,874 square miles. The country is full of jungles, and is traversed by a hilly tract, forming part of the Vindhya Mountains. The soil is fertile, yielding wheat, maize, millet, pease, and other vegetable productions peculiar to central India. Sugar, tobacco, ginger, and cotton are the chief exports. The district is well watered by the Nerbudda, Betwa, and other minor streams. The state of Bhopal was founded by an Afghan adventurer, named Dost Mohammed Khan, who in 1723 succeeded in establishing himself here by the countenance of Aurungzebe, on whose death he assumed the title of nabob, which was retained by his successors. Bhopal has all along been friendly in its relations with the British. In 1818 the state was placed under British protection. Pop. (1901) 1,198,350; (2) a town, capital of the above state, on the boundary between Malwah and Gundwana, 108 miles east of Oojein. It was defended successfully in 1813 against the forces of Scindia and the rajah of Nagpore. It is surrounded by a wall two miles in circuit, and contains a fort. Outside is another fort on a large rock, the residence of the ruler of Bhopal. Among other buildings of note are two mosques, arsenal, mint, and the palace of the Begum. Large artificial lakes supply good water.

Bhuj, or **Bhoj**, the chief town of Cutch in India, Bombay presidency, at the base of a fortified hill, with military cantonments, high school and school of art, mausoleums, of the Raos or chiefs of Cutch, pagodas, etc., including a temple dedicated to the cobra di capello. Bhuj is famous for its manufactures of gold and silver.

Bhutan, bhoo-tān', an independent State in the eastern Himalayas, with an area of about 16,800 square miles, lying between Tibet on the north and Assam and the Jalpaiguri district on the south, and consisting of rugged and lofty mountains, abounding in sublime and picturesque scenery. Pop. (estimated) 200,000. The Bhutanese are a backward race, governed by a Dharm Rajah, regarded as an incarnation of Deity, and by a Deb Rajah, with a council of eight. They are nominally Buddhists. After various aggressive incursions and the capture and ill treatment of Ashley Eden, the British envoy, in 1863, they were compelled to cede to the British considerable portions of territory, in return for a yearly allowance of £2,500.

Bia'fra, Bight of, a large bay on the west coast of Africa, at the head of the Gulf of Guinea, between Capes Formosa and Lopez. The principal rivers flowing into it are the Niger, the New and Old Calabar rivers, the Rio del Rey, the Cameroon, and the Gaboon; its islands are Fernando Po (Spanish), and St. Thomas' and Prince's (Portuguese). Opposite Fernando Po are the Cameroons.

Bialystok, byāl-ē-stōk', or **Bielostok**, a town of Russian Poland, province of Grodno, on the Bialy, 45 miles south-southwest of Grodno, with which and Warsaw it is connected by rail. It is a well-built, handsome town, with a spacious market, gymnasium, and several churches, and has among its edifices a palace which belonged to the counts of Braniski, and was once known as the Polish Versailles. Its manufactures are woolen goods, leather, hats, soap, etc. Pop. about 70,000.

Biancavilla, byān-ka-vēl'la (Italian *bianca*, white, and *villa*, town), a city of Sicily situated on the slope of Mount Etna, 20 miles northeast of Catania, founded in 1480 as an Albanian colony. Lava is employed for paving its streets, and in its neighborhood are the noted grottoes of Scila and Archi, the former basaltic, the latter in the lava of 1607 with a tunnel half a mile in extent. Wine and grain are produced in the district and all the cotton in this portion of Sicily is called Biancavilla.

Bianchi, byān'ke, **Francesco** (called IL FRARI), Italian painter: b. Modena, 1447; d. 1510. He was the instructor of Correggio, according to Vidriani, and his works were esteemed for graceful design and agreeable coloring. Among his few works extant are a 'Madonna with Saints,' now in the Louvre. He must not be confounded with Federigo Bianchi, a Milanese artist, born about the end of the 16th century. The paintings of the latter are numerous in northern Italy, and are held in high esteem. He wrote a volume of biographies of painters.

Bianchini, be-ān-kē'ne, **Francesco**, Italian astronomer: b. Verona, 13 Dec. 1662; d. Rome, 2 March 1729. He was intended for the clerical

profession, but repaired to Rome, and applied himself to jurisprudence, and continued the study of experimental physics, astronomy, etc., as well as of Greek, Hebrew, and other languages. Pope Alexander VIII. bestowed on Bianchini a rich benefice, with the appointment of tutor and librarian to his nephew, the Cardinal Pietro Ottoboni. Pope Clement XI. also patronized him, and appointed him secretary to the commission employed in the correction of the calendar. Being on a tour through France, Holland, and England, he formed the idea of drawing a meridian in Italy, from one sea to the other, in imitation of that which Cassini had drawn through France. He was occupied eight years at his own expense in that work; but other employments withdrew his attention from it, and it remained unfinished. He concluded his career with two important works (1727) on the planet Venus, and on the sepulchre of Augustus.

Biard, Auguste François, byār, â-güst frôn-swā, French genre painter: b. Lyons, 27 June 1801; d. near Fontainebleau, 8 July 1882. He traveled extensively, visiting Spain, Greece, Syria, Egypt, Mexico, Brazil, etc. Among his best known pictures are the 'Babes in the Wood' (1828); the 'Beggars' Family' (1836); the 'Combat with Polar Bears' (1839); and 'The Strolling Players,' now in the Luxembourg. A strong element of caricature runs through most of his works.

Biard, Peter, French missionary in America: b. Grenoble, 1565; d. 1622. He was one of the first two missionary priests sent to New France, and with his companion, Masse, on 10 June 1611, he wrote the earliest letters sent by the Jesuit order from Canada. He at once began a study of Indian languages, established friendly relations with the Indians on the Kennebec in 1612, and in 1613 founded a colony on the island of Mount Desert. The colony was soon destroyed by the forces of Argall, deputy governor of Virginia, and Biard, being captured, was sent to England. This enterprise of Argall's marks the actual beginning of hostilities between the French and English in North America. Biard was liberated after a short time, and returning to Lyons, published in 1616, 'Relation de la Nouvelle France, et du Voyage des peres Jésuites dans cette Coudrée.' This is the earliest of the 40 volumes of 'Jesuit Relations' (1632-72), which are such valuable storehouses of material for early American history.

Biarritz, bya-rêts, a fashionable watering place of France, department of Basses-Pyrénées, five miles south of Bayonne. It is a favorite of bathers and other persons who come from all parts of Europe, and especially of the Basque mountaineers, who deem it an obligation to drink of the mineral waters once a year, as well as to bathe in the sea of Biarritz. In 1856, the place acquired additional importance from being made the summer residence of Napoleon III. and his court. Since then its popularity both in winter and summer, has steadily increased. It has no industries and is composed almost entirely of hotels and lodging houses. Pop. 12,000.

Biart, byār, Lucien, French novelist, poet and writer of travels: b. Versailles, 21 June 1829. He published a number of novels, containing masterly descriptions of Mexican and South American nature and customs. Among

his works are 'The Mexican Women' (1853), poems; 'Adventures of a Young Naturalist' (1869); 'The Clients of Dr. Bernagius' (1873); 'Across America' (1876).

Bias, bē'as, one of the seven wise men of Greece: b. Priene, one of the principal cities of Ionia, about 570 B.C. He was a practical philosopher, studied the laws of his country, and employed his knowledge in the service of his friends, defending them in the courts of justice, or settling their disputes. He is said to have died at an advanced age immediately after successfully defending in court one of his friends. The inhabitants of Priene having resolved to abandon the city with their property, Bias replied to one of his fellow-citizens, who expressed his astonishment that he made no preparations for his departure—"I carry all that is mine with me."

Bibb, George M., American jurist: b. Virginia, 1772; d. Georgetown, D. C., 19 April 1850. He graduated at Princeton in 1792, and took up the practice of law in Kentucky. He was twice chief justice of the State court of appeals, served two years in the State senate, and was chancellor of the court of chancery. He was a senator in Congress, 1814-19 and 1829-35, and secretary of the treasury under President Tyler. During later life he practised his profession in Washington, D. C. He compiled 'Reports of Cases at Common Law and in Chancery in the Kentucky Court of Appeals' (1808-11).

Bibbiena, bē-byā'na, Bernardo Dovisio (styled BIBBIENA), Italian poet: b. Bibbiena, 4 Aug. 1470; d. 9 Nov. 1520. For many years secretary to Cardinal Giovanni de' Medici, in whose election as Pope Leo X. he is said to have had a considerable share, he was appointed treasurer, and soon after raised to the dignity of cardinal (1513). In this dignity he became an ardent promoter of art and science. His comedy, 'Calandria,' is probably the earliest in Italian literature.

Bibbiena, Giuseppe, Italian painter: b. 1606; d. 1757. The most distinguished of the Bibbiena family, he was famed as architect, as well as an artist. Not only did he design gorgeous decorations for a court wedding at Munich in 1722 and a dazzling court festival in Prague in 1723, but he built the noted theatre at Bayreuth in 1757 and remodeled the opera house at Dresden. The 'Architettura e Prospettiva' (1740) contains several illustrations of his works.

Biberach, bē'bē-rāh, a town of Würtemberg, on the river Riss, 22 miles south-south-west from Ulm. It is irregularly built, and with its old walls, still in part remaining, and its old towers and gateways, has a mediæval aspect. Among its buildings is a fine church, dating from 1100, and recently restored. The town has important educational institutions, and a richly endowed hospital. The French, under Moreau, defeated the Austrians near Biberach in 1796. There is a monument to the poet Wieland, who was born in the vicinity, and another to the Emperor William I. The town is noted for its bell foundries and manufactures of artificial flowers, leather, toys, and machinery.

Bibiru, bē-bē-roo, a tropical tree of the laurel family.

Bible. I. The word Bible comes from a Greek word meaning book. It has come to us through the Latin *Biblia*. This is in the Greek a neuter plural. But it came to be used as a feminine singular, and so gives us our word Bible. Bibliotheca, also a Greek word, meaning library, was a designation during the Middle Ages. Earlier Latin writers used the word "testamentum" or "instrumentum," both designed to translate the Greek word for covenant. In the New Testament the usual word to designate the Old Testament is "Scripture" or "Scriptures."

II. *Languages.*—The Old Testament was written originally in Hebrew, with the exception of brief portions in Aramaic, a closely kindred dialect, namely, Jer. 10:11, Ezra 4:8-6:18, 7:12-26, Dan. 2:4-7:28. The New Testament was written wholly in Greek.

III. *Divisions.*—The most striking partition in the Bible is into two Testaments, the Old and the New. This is due to the broad difference between the era of Hebrew Messianic hope and the actual appearance and work of Christ. All preceding Christ belongs to the Old and unfulfilled. All following Christ belongs to the New and complete. Within the Old Testament there has been marked from the time of the prologue to Sirach, 132 B.C., a three-fold division. These are the Law, containing the five Mosaic books; the Prophets, including the so-called Former Prophets: Joshua, Judges, I and II Samuel, I and II Kings; and the Later Prophets: Isaiah, Jeremiah, Ezekiel, Hosea, Joel, Amos, Obadiah, Jonah, Micah, Nahum, Habakkuk, Zephaniah, Haggai, Zechariah, Malachi; and the Kethubim, a Hebrew word meaning "Writings" (called also Hagiographa, a Greek word meaning "Holy Writings"): Psalms, Proverbs, Job, Song of Songs, Ruth, Lamentations, Ecclesiastes, Esther, Daniel, Ezra, Nehemiah, I and II, Chronicles. There are also smaller divisions made by the Hebrew Scribes, 200-400 A.D. These were called Parashas. The longest of these number 54 in the Pentateuch, and are designed for Sabbath reading. Corresponding with these 54 Mosaic sections there were 54 lessons selected from the Prophets, also for Sabbath reading, called Haphtaroth. These divisions varied in number in different sections and times. The arrangement in books also shows variation. Some schemes give 24 books, so the Talmud; others give 22 books. The Septuagint and Vulgate versions reckon 39 books. This is now universal in Christian editions of the Bible, derived through the great edition of the Hebrew Bible by Jacob ben Hayim in 1525-6. The Talmud refers to still smaller divisions as Pesukim, nearly corresponding to our verses. In the manuscripts of the New Testament divisions appear very early. Such are traced to Tatian in the 2d century, to Ammonius in the 3d century, to Eusebius in the 4th century, to Euthalius in the 5th century. Our present chapter and verse divisions were completed by Robert Stephens in 1551, imitating Rabbi Nathan, c. 1437. Stephens' work was adopted by the Geneva Bible in 1560, and by the English version of 1611. The division into chapters originated with Stephen Langton, who died 1228.

IV. *Its Nature.*—The Bible, as it stands, is in the general judgment of Christendom a book altogether unique. Therein Christians look to find the very word of God. This divine message

they deem pure and full, and they gladly adopt it as a binding rule of faith and life. A central feature of the volume is its claim to divine origin. Here God speaks to men. Here men learn of God. This is the direct assertion or the evident implication of its burden everywhere. The covenant with Abraham was made by God. God spoke to Moses. Hebrew history was dominated by God. The messages of all the prophets were obtained from God. The great poetical works carry continually the postulate and the evidence of open fellowship with God. If this note seems lacking, as in Esther and much of Ecclesiastes, this fact raises unfailingly a question as to their being in their proper place. In Christ, as portrayed in the Gospels, this note finds most perfect utterance. Jesus of Nazareth is the Incarnate Word. He hath seen and known the Father; and of all the Father's words he is true and faithful Witness. And the Apostles are Christ's specially prepared heralds of this same heavenly word. They speak for Christ and God. There is in all their ministry the living presence of the exalted Christ. This is "the thesis of the New Testament." Thus throughout, the Bible makes a claim to be the very word of the true and living God. This is its prime trait. This determines its nature.

Touching this quality a few things need to be said. Only so can the Bible be defined. First, as to the nature of the Deity thus made known. He is a Person. He has every personal trait. He is free and wise and kind. He is faithful and gracious and pure. He is full of goodness and truth. He is Spirit. He is of all being the only life and essence and strength. There is in him no transition or decay or change. He is pure and very life. He is transcendent. By him all things are made and ruled and judged. He is a friend. With him all persons may find fellowship. He is holy. His very being is the very energy of infinite and unfailing truth and love. Such is God. His person is the central glory of the Bible. Herein the Bible is unique. Its deity stands in simple, infinite, spiritual majesty unveiled in every part of the record. This truth finds culminating utterances in Christ's words to the woman in John 4:24: "God is a spirit, and they that worship him must worship him in spirit and truth." This fundamental verity stands clear amid all the obscurity of Gen. chapters i-xi, and all the bewildering mysteries of the closing Apocalypse. This teaching concerning God, more than anything else, gives the Bible its peerless tone and worth. And this teaching is not abstract. It stands in life. Most powerfully is it proclaimed in the great Theophanies. These present at once the glory and the power of the Biblical claim. And these Theophanies are not incidents. They have commanding prominence and embody mighty meaning. They are in every case outstanding landmarks and points of departure. They are typical scenes. They figure in the Biblical landscapes like beacons whose rays fall everywhere.

But these disclosures are all gathered up in Christ. His figure stands in the very centre of this book. On him all symbols and expectations and prophecies converge. In him all excellencies and dignities and graces combine. From him all instructions and commissions, all judgments and mercies proceed. In him the old

BIBLE

and the new are made to agree. He is the very Lord of very life and truth and love. In his person and word and work all the energies and all the intimations of every Biblical scene find an equilibrium that is absolute. In him all Biblical life finds at once free play and full repose. In him the Bible lies concealed. In him the Bible stands revealed. He is the Son and Word of God.

It follows and stands evident that the Bible is a book of life. It is a record of the interplay of wills. It is always dealing with persons. Its central values are moral. Its revelations look toward reform. It is a searcher of hearts. Its appeals are to men; and they are potent. If repulsed, then its rebukes throb with resistless force. It is always scanning character, feeling after conscience, working toward the will. It has an unexampled amount of comment upon righteousness and sin, merit and blame, law and obligation, responsibility and reprisal in the moral field. It is from cover to cover a book of ethics, practical ethics, but an ethics that finds all its roots and regulations in its pure and lofty views of God. God, the pure, the holy, the supreme, is the ethical norm. With him man has vital fellowship—man the godlike and finite, the perishable and immortal, the lord and the slave, the individual and the brother. As is instantly apparent, such being God and such being man, their moral interrelations are bound to be most complex. But just here again,—and this is why these facts are named,—the Bible is in its nature unique. Its values are real, true to life. Its ethics are genuinely ethical, never formal, never partial. Its views of character are balanced and vital and full. It fully recognizes the moral value of humility and aspiration, of truth and love, of isolation and friendship, of physical and spiritual in man. Here again Christ alone is norm—norm of ethics, norm of the religious life, norm of the earthly experience, norm of the immortal life. This balanced completeness of life is a most manifest and distinguishing mark of the Biblical view. Its moral estimates are at once a full-voiced echo and a final interpretation of the life of the world.

These vital moral estimates, while fully unified, fall apart into two most striking subdivisions. This is due to human sin. Because of this undoing two widely different notes resound throughout the Sacred Word, namely, judgment and grace. In one or other of these two forms the Bible may be defined as the adjustment to sin. Universal man has gone morally astray. Upon this perversion moral judgment surely impends. This doom may be inflicted, or delayed, or reversed. This is the inner sum of Biblical truth. This is the Bible within the Bible. Here lies the inner secret of the Bible's matchless power. Under its high beliefs concerning God and its broad and searching thoughts on man, it fashions and proclaims, as no other volume ever did, its estimates of three stupendous themes: the deep and dark iniquity of sin; the awful inevitableness of its proper doom; and the divine provision and proffer of saving, sacrificial grace.

But once again, it needs to be said, the Bible is a book of life. Its messages are all set in the midst of events. It uncovers and traces the flow of a stream of history. This historical factor needs minute attention in defining the

nature of the Bible. Here is a book always handling values of the highest, even absolute worth. But it is always setting them forth in simplest concrete forms. Its ideals, always phenomenally lofty and pure, are unfailingly in immediate touch with the real. Its events issue in the alternatives of eternity; but they always run along common historical paths. This striking feature, undeniably one secret of the Bible's strength, is as undeniably prolific of most vexing problems. As a storehouse of eternal principles for the moral and religious life, the Bible rises and stands beyond the reach of criticism, denial, or assault. But as a series and collection of historical events, it lies open on every side to every sort of historical challenge and test. Hence the Bible presents abidingly two widely diverse aspects—the ethical or theological, the philosophical or metaphysical, in a word the abstract; and the historical or literary, the natural or phenomenal, in a word the concrete. The former always challenges character. Its vesture and voice are imperial. It demands acceptance. To renounce its claim is to sin wilfully. The latter is always suggesting inquiry. It invites scholarly scrutiny. Multitudes of its problems hang in continual uncertainty. Hence the various phases of modern Biblical criticism.

Such is the Bible in its nature. It voices God's message to men. It reveals God's true being. It concentrates in Christ. It is a book of life, vivid, complete. Its attention is incessantly fixed on sin. It is enshrined in history. Its central religious and ethical teachings are fundamental postulates. They lie beyond the reach of fair debate. It is so embedded in incomplete and changing scenes as to provoke and sustain age-long debates. Some of the chief of these debates will be traced in succeeding sections of this article.

V. Genesis of the Old Testament.—A few general statements may be profitably made first. These will clear the way for a sketch of more special matters. The present Old Testament canon is substantially that adopted by the Jews of Palestine, and in vogue among them at the time of Christ. It had practically held sway there for at least over a century and a half. Prophetic writings and teachings had been sacredly revered for over seven centuries before Christ. Anterior to this, Mosaic laws were recognized as a religious and ethical norm. These scriptures were held by Christ in supreme esteem. In this view and under his interpretation they held the sum and essence of his teaching. They had divine value for such as sought the way of eternal life. In them was the word of God. This high estimate was adopted by Apostles and Church fathers.

All these statements may confidently be made. But they leave unanswered two important questions, each calling for extended treatment: when did the various constituents of the Old Testament gain entrance there? And what problems encumbered this process? These questions are exceedingly broad. They open up the whole debate of modern Bible study. In handling these matters the methods are mainly those of historical and literary criticism. In the historical study factors and arguments shift and change with the years. The method is mainly by comparative study of archaeology, chronology, history, and literature. Illustrations are the tablets of Tel-el-Amarna, the Moabite

stone, the creation tablets, the lists of Babylonian and Assyrian kings, and the records of their various campaigns. But these studies deal mostly with the contents of the Old Testament books, and not with the books themselves and the main divisions of the Old Testament viewed as literature and growing into a canonical unity.

Of the literary arguments bearing upon this question the most telling is that of parallel accounts or doublets. These repetitions show variations. These variations suggest different points of view, different authors, and a combining editor. A careful study of these literary phenomena leads into a broad field of Biblical literary criticism. The aim of this study is to trace out the various authors and times and histories of these different documents. At present the tendency in this study is strongly analytic. The accent in the investigations is laid upon the differences. These differences once well defined and fixed, the effort is to trace the origin and date of each distinct document and to explain when, and how, and why they were combined into the present form. The keynote of all this process is differences. Upon this, main arguments rest. These arguments stand strongest, when the differences amount to discords or contradictions. Many of these variations are openly apparent. Many others, so it is claimed, are glossed over by ancient editorial efforts after harmony. These modulations should be removed, and the original contrast stand clear. Hence much textual emendation. It tends to sharpen contrasts. By this process each separate document is brought to a strict unison with itself, and a sharp dissonance with its companion in the doublet. Each fragment has a marked individuality, stripped as much as possible of inner manifoldness. One document, one idea; or if several ideas, then as few and similar as may be. These separate and diverse documents thus reduced and defined are then arranged, as to origin and editorship, in an evolutionary scheme of history. The simple and crude are dated early. The complex and refined are dated late. Thus the origin and evolution of the Old Testament is explained by the method of literary criticism at present characteristically in vogue. Elements aiding this process are direct historical testimony to a document's existence, the argument from silence, literary style, fixed literary forms, ethical, and religious views. A fundamental postulate is an evolutionary view of history. A dominant impulse is to trace phenomena to a natural source.

The outcome of this method is to affirm late origins for most Hebrew literature. A sample arrangement may be found in Driver, 'Introduction to Literature of Old Testament.' In general, the existence of any volume of recognized sacred Mosaic law prior to 622 B.C. is denied; or of anything but Deuteronomy prior to 444 B.C.; or of any recognized prophetic canon prior to 444 B.C.; or of any canonical volume including the books usually clustered with Psalms and Proverbs, prior to 165 B.C. In particular, the Psalms are largely denied to David, and dated instead after the exile. Daniel is dated at 164 B.C. Still it is largely concluded that teachings of Moses and of Prophets, as also certain Psalms, were held in honor earlier.

To this method and its conclusions are opposed considerations like the following: Its

scheme of doublets is overworked; its conjectures are too numerous; its textual emendations too frequent and ungrounded; its standards are too uncertain; its documents are so stripped and reduced as to become void of life. By no such rigid rules does man express himself. Silence is no proof. The ancient editors are too mythical and their backs too heavily loaded, and that with most unlikely wares. Too much is made of documents. Not enough is made of men. History is fuller and more manifold everywhere than this method allows. Divine interventions, incitements, instructions, overrulings, and Theophanies are treated with too scanty respect. Evolutionary views do away too easily with the manhood of early men. Biblical history and conditions are not so primitive by long millenniums as this method seems to presume. In particular the lofty value of the Psalms demands more attention. By the negative critical method they stand unexplained. Vastly more lay back of the 8th century than this method presents. Too much is loaded upon Ezra and in the period of the Maccabees. Far too many direct Biblical affirmations have to be reversed.

Thus scholars conflict touching the genesis of the Old Testament. In this far-reaching debate the following evidence and events are of most importance to hold in view. The allusions within the Old Testament to the existence of sacred books, such as Ex. 24:4, 7; 34:27; 40:20; Deut. 31:26; Josh. 24:26; I Sam. 10:25; Isa. 8:16; Jer. 30:1; 36:1, 28; II Kings 22:8; Dan. 9:2; Neh. 8-9; the Praise of the Famous Men in Sirach (chapters 44-50); the prologue to Sirach; the opinions of Philo; the estimate and usage of the New Testament; Josephus, *contra Apion* 1, 8; II Esdras 14:44-46; the work of the Council of Jamnia; and the evidence of the Mishna; also all light obtainable in the great field of comparative studies, specially from Babylonian archaeology. In broad outline, the main problems are to find out what sacred literature existed prior to 165 B.C.; then prior to 444 B.C.; then prior to 623 B.C.; then prior to 750 B.C., the period of the great written prophecies; then in the Davidic era; then at the time of Moses; then to find the origin of the various fragments in the unique section Gen. 1-11. Touching most of these problems, definite information is at present nowhere in reach. The precise connection of the Biblical creation and flood accounts with Babylonian material, the contents of the sacred books in the Mosaic era, the range of sacred literature in Isaiah's time, the list of Davidic Psalms, the literature held sacred in the exile, the scope of the books handled by Ezra, the outside outline of Sirach's sources, or of his grandson's allusions, a sharp definition of the rise and influence of apocryphal writings, a satisfying explanation of the varying or the final order of Old Testament books, the meaning of the Septuagint divergences, and the actual evaluation of apocryphal literature by our New Testament writers—these all are questions fairly open to debate. Knowledge is incomplete.

VI. *Canon of Old Testament.*—Study of the genesis of the Old Testament leads naturally into an examination of its development into a fixed and closed canon. While it seems proper and safe to say that our present Protestant Old Testament canon is identical with that accepted

by the Jews of Palestine in and before the time of Christ, there are numerous evidences that even among Palestinian Jews several canonical questions were under debate for a century or two after Christ.

To begin with the latest Jewish testimony and work backward toward origins, first mention has to be made of a full statement from the Babylonian Talmud. This passage is traced to Rabbi Judah the Holy, head of the school of Tiberias in the 2d century. He is said to have collected the Mishna. In this statement all the parts of the Old Testament, as we have it, are named with a definite statement as to authors. "Moses wrote his book and the section concerning Balaam and Job. Joshua wrote his book and those eight verses in the Law. Samuel wrote his book and the book of Judges and Ruth. David wrote the book of Psalms 'at the hand of' 10 old men, to-wit: Melchizedek, Abraham, Moses, Heman, Jeduthun, Asaph, and the three sons of Korah. Jeremiah wrote his book and the book of Kings and Lamentations. Hezekiah and his friends wrote Isaiah, Proverbs, Song of Songs, Ecclesiastes. The men of the great synagogue wrote Ezekiel, the Twelve, Daniel, and the little book of Esther. Ezra wrote his book and the genealogies which we read in the book of Chronicles." This statement seems, considering its probable source, to indicate a fixed canon. But discussions of certain Old Testament books occurred considerably later. These concerned Proverbs, Song of Songs, Ecclesiastes. Proverbs was charged with internal contradictions. All three were deemed uncanonical by some, because they contained parables. Repeatedly, debates rose as to whether Ecclesiastes and Esther were fully canonical, that is, whether they "defiled the hands." The regulations about the feast of Purim in Esther seemed to contradict the Pentateuch. While for Ezekiel, its strange legislation in the closing section made real trouble. At a much later time Jonah made occasion for special remark, because of its neglect of Israel and attention to Gentiles. For full information upon this stage of Jewish thought, see Wildeboer, 'The Origin of the Canon of the Old Testament,' pp. 56-75. As to the meaning of these facts men judge differently. Some say these books were all held canonical; it was simply a discussion of vexing problems which they contained. Others say these debates imply that these books were not as yet within the canon.

Another date and event to be marked is a council at Jamnia, in western Palestine, about 90 A.D. Then problems were raised about certain books, in general the Kethubim, but in particular, Ecclesiastes and Song of Songs. They were all declared holy, that is, canonical.

About this time is to be dated II Esdras 14:44-46. Here is an apocalyptic story of Ezra's miraculous dictation of 94 sacred books, 24 of which were to be promulgated as the public Jewish canon. This story must have found its motive partly in the fact that at about 90 A.D. the Jewish canon held 24 books.

Josephus also belongs to about this date. He has left in *contra Apionem*, 1:8, a painstaking list and estimate of the Jewish canon of his time. He makes the number of the books 22. He reckons five to Moses, 13 to the prophets, and four containing hymns to God and maxims for human life. He does not name

the several books. It is therefore uncertain whether his list agrees with ours. Some think he left out Ecclesiastes and Song of Songs. Some think he joined Lamentations to Jeremiah, and Ruth to Judges. In any case his statement is most notable. He boasts of their limited number, of their antiquity and their cordial acceptance. He closes the canon with the period of Artaxerxes. Later books are not deemed worthy of like faith. No one has dared to increase or diminish their volume. They are cordially deemed God's oracle, and held as rules for life and death. All these arguments are made with deliberation for purposes of defense. They form a weighty evidence.

Philo, who lived somewhat earlier, an Alexandrian Jew, seems to have held just the list accepted by us as strictly canonical and of authority. His reverence for the Mosaic writings is most evident. He quotes nothing from the Apocrypha. This is noteworthy. He also leaves wholly unmentioned 17 of our canonical books.

In the prologue to Sirach is a reference three times over to "the Law," "the Prophets" (Prophecies), and the "Others" (other books, remaining writings) with suggestions, also repeated, of their unique value for culture and wisdom, and of their fulness and significance. This was written about 130 B.C. It seems to betoken a complete threefold canonical collection. It occurs in a brief statement explaining the work of his grandfather which he is about to publish and commend to the men of his time.

This work of Sirach, the grandfather of the foregoing, was written about 180 B.C. It is permeated with the very substance of our Old Testament. Its clearest light on the problem of the Old Testament canon is in chapters 44-50. Here he sings the praise of famous men. He selects 24 names, besides the Judges and the 12 Minor Prophets, from Enoch to Nehemiah, and sings their praise. To this he appends a song to Simon of his own time. And at the end he names himself. In these eulogies Sirach holds scripture in high esteem. He seems to especially honor the Law. But it becomes specially difficult to say anything about his views of Old Testament canon. He seems to attribute to Simon and even to himself a respect all but equal to that accorded to the prophets. Plainly all the law and all the prophets and all the historical books were before him. Some of the Hagiographa fail of mention. There was manifestly, at 180 B.C., an Old Testament canon of recognized sacred standing, all but commensurate with ours of to-day.

The situation in the time of Ezra is far from clear. The passages to examine are Nehemiah 8-9; Ezra 7:6, 10, 12, 25, 9:10. From these passages it stands apparent that Ezra was a ready scholar in the law of God; that he had prosecuted his study during the exile; that some literature held sacred by him had been long in hand; that much of our Mosaic law was recognized as Mosaic by him and by the assembly described in Nehemiah 8-9; that religion, morals and life were constructed upon this Mosaic foundation. But just the extent of the Mosaic writings, just their antiquity, and just what other literature may have supplemented them is far from explicitly said.

BIBLE

Daniel 9:2 alludes to books that must have been prophecies, alluding in particular to Jeremiah. In his prayer he alludes to laws, ordinances, a covenant, the deliverance from Egypt, the warnings of the prophets, mentioning Moses. But no canonical list can be constructed here.

To this may be added citations from earlier portions of Scripture, indicating the existence of sacred records. None of these citations are certainly definitive of canonical limits at any period. But it may not improperly be said that the multitudinous allusions throughout Old Testament scripture to early divine revelations and leadership all, if only taken at their face value, go to show that records of these early events were always at hand and held validly sacred depositories of the Word of God. But historically, the inner content and the outside outline of this Old Testament canon comes into sight and shape for the first time in the words of Sirach about 180 B.C. Then it stood practically as it stands with us to-day. Later queryings were limited and substantially insignificant. And such debates as did arise were due to the extreme reverence of the Jews for the Mosaic Law, to their peculiar interpretation of that law, and to their jealousy to have all their sacred writings stand in fullest harmony therewith. For statements of their extravagant respect for the law see Weber, 'Die Lehren des Talmuds,' pp. 1-60, and Wildeboer, pp. 94 —.

From among Church fathers three witnesses call for special mention here. Melito, Bishop of Sardis, about 170, went into Palestine expressly to get the Jewish view of the number and order of the books of the Old Testament. His finding is given in Eus. Hist. Eccl. iv. 26. His order is peculiar. He omits Esther entirely. Nehemiah and Lamentations are not named, but probably they are included, the one with Ezra, the other with Jeremiah. Origen's canon is also found in Eus. Hist. Eccl. vi. 26. This list omits the Twelve Prophets, probably some mistake. It includes Esther. It adds the letter of Baruch. Origen died 254 A.D. Jerome died 420 A.D. In his preface to his translation to Kings he gives the Hebrew canonical list, 22 books. This is a very precise and carefully detailed statement. It is found in full in Wildeboer, pp. 80-84. He gives Jewish views, names the Apocrypha separately, and lists the canon as we have it to-day. He speaks elsewhere of Jewish queryings about Ecclesiastes. The Nestorian Christians reject Esther, Chronicles, Ezra, and Nehemiah, but accept Sirach. But in the main always, and from Jerome onward the Christian Church accepted the Jewish canon as finally fixed by them 200 A.D., and as we have it to-day. Still, through the influence of the Septuagint, the Vulgate, and Augustine, the Roman Catholic Church has retained also the Apocrypha.

VII. *Text of Old Testament.*—Our earliest information names tables of stone. Upon these were written the commandments. Deuteronomy was a roll, when found in the temple. Jeremiah's writings were a roll. The script was originally the old square characters seen on the Moabite stone, and in the Samaritan copy of the law. Later, no one knows when, the Aramaic characters were used. This is the script used to-day in all Hebrew Bibles. In the Maccabean

period, the Syrian oppressors destroyed most of the Jewish sacred literature. Judas Maccabeus collected them all again. Possibly it was he who introduced the new writing. See II Maccabees 2:14. When the Jews fixed and adopted an official Old Testament text is unknown. Most date the act at the beginning of our 2d century, at the councils of Jamnia, 90 and 118 A.D. Tradition says they used three manuscripts found at Jerusalem. These early texts were wanting in vowels and separation of words. The scribes, 200-500 B.C., made numerous changes in the way of corrections, definition, pronunciation, and other improvements, including divisions and arrangements for liturgical use. These scribes were followed by students who were called Massoretes who simply guarded and perpetuated the work of the scribes. From this has come our present, so-called Massoretic text. These Massoretes added vowel points, completing their work in the 7th century in Babylon, and in the 8th century in Palestine. This work is perpetuated in the text of Ben Asher of the 10th century. Upon this all later western manuscripts have been based. In these latest years some efforts have been made to reconstruct the ancient texts, notably by Baer and Delitzsch. For samples of just what may be done, consult Kautzsch, 'Die Heilige Schrift des Alten Testaments,' in the textual emendations collected in the appendix.

VIII. *Manuscripts of the Old Testament.*—Jews have been extremely jealous of the purity of their manuscripts. Rules calling for minutest accuracy are laid down in the Talmud. See Kenyon, 'Our Bible and the Ancient Manuscripts,' p. 34. This carefulness secures truthful copies. Hence recent manuscripts are prized quite as highly as those most ancient. Indeed the old manuscripts are religiously destroyed, so that they may escape desecration. Hence we have no Hebrew manuscripts earlier than about the 10th century, and even these are few and incomplete.

IX. *Versions of the Old Testament.*—The Samaritan Pentateuch, though not a version, should be mentioned. If its original form could be produced, it would give us a Hebrew text, perhaps dating from the days of Neh. 13:23-30. But we have no manuscripts older than the 10th century.

The Septuagint version was made from Hebrew into Greek, somewhere between 300 and 130 B.C. This version was extended to embrace the Apocrypha. Other Greek translations were made: one by Aquila about 150 A.D.; one by Theodotian a little later; and one by Symmachus about 200 A.D. Origen tried to restore the Hebrew text about 240 A.D. Only fragments of this work survive. The same effort is made about 300 A.D. by three other men, Eusebius, Lucian, and Hesychius. The best evidence for restoring to us the original Septuagint is contained in the three famous manuscripts: the Sinaitic, the Alexandrian, and the Vatican, dating from the 4th and 5th centuries A.D. The best printed edition of the Septuagint now extant is that by Swete. A much larger edition is now in progress at Cambridge.

Other versions of the Old Testament dating from the early centuries are the Syriac, 2d or 3d century A.D.; the Coptic, 3d century A.D.; and the Latin, chief being Jerome's Vulgate, about 400 A.D.

X. *Genesis of the New Testament.*—In the earliest days of the New Testament Church their sacred book of authority was the Old Testament. The apostles of Christ were continually referring to these Hebrew writings and expounding them. But in this process they were also always preaching that Jesus was the Christ. The Old Testament Messiah and the Nazarene were one. This was their dominant theme. As an outcome their message was full of statements about Jesus. Indeed, this was the centre and the sum of their preaching. Thus their proclamation put into being a body of teaching about the person and words and deeds of Jesus Christ. In this Christic life the Old Testament found its fulfillment. Hence there came to stand alongside the Old Testament material another body of truth, having equal sacred value, namely, the report and record of the life of Jesus Christ. Moreover, at the same time, and in the same process there came into form and shape the substance and sacred authority of an Apostolic message. And so, gradually, and in a vital way, as an outcome of the growing life of the New Church, a set of writings called Apostolic came to be acknowledged as a New Testament Canon and to be set alongside the Old Testament as having equal authority and worth. This process took time, and had its stages. Its separate steps we are not able to trace. It stood complete in the canons of the 3d Council of Carthage 399 A.D. From that date onward the New Testament stands in its full integrity as a canonical body of sacred literature. So all Christendom has agreed.

To trace this historical uprising of our New Testament is well nigh the most urgent task of modern Christian scholarship. Something needs to be said about this. Christ left no writings. This seems undoubtedly sure. It seems almost equally sure that the first New Testament writings were the natural outgrowth of the Apostolic work. In this process Paul holds the pre-eminent place. His writings, while mostly born of special needs, held an enduring value. They engrossed his authoritative message. As such they were cherished, and formed a nucleus of sacred New Testament literature. In some vital connection with this growing life and work under Apostolic lead, there grew up our gospels. Just how, and just when this most important work was done no one surely knows. Efforts at the reconstruction of this process are making everywhere and all the time. But the procedure is almost entirely theoretic.

Certain facts stand clear. The gospel of John stands in a place by itself. Its outline of Christ's life, its choice and treatment of material, and its central themes are all widely and strangely unlike the main features of the other gospels. Luke also has a striking individuality, containing a surprising quantity of material found nowhere else, though for all that agreeing strikingly and in essential respects with Matthew and Mark. Matthew and Mark are plainly very closely akin. They are commonly felt to have arisen in some way expressive of close fellowship of aim, form, sources, and time. Touching the origin of all four explicit inner witness is lacking. The simple fact of their actual rise into a position of supreme authority and respect, whatever may have been the method or means, gives every presupposition in favor

of the genuineness of all four as authorized reports of Jesus' life. Thus much needs saying by itself.

Certain traditions about their origin have figured very influentially. Eusebius, about 300, reports from Papias, about 140, that a "presbyter" used to say that "Peter used to give his instructions according to what was required, but not as giving an orderly exposition of the Lord's words." These "Mark, having become an interpreter of Peter, wrote down accurately, etc." Immediately in the same context Eusebius quotes Papias as saying of Matthew that "he wrote the oracles in the Hebrew dialect, and each one interpreted them as he was able." Of Luke we can gather no helpful traditions; we have to gather all we know from references in his gospel, in Acts and in Paul's writings. While the mention of the gospel of John opens a world of sharpest scholarly divergence and debate.

Now to outline briefly leading theories: The gospels are conjectured to have originated something thus: First, in the first three gospels there are striking signs of broad similarity; their general synopsis of the main outline of Christ's public life is the same; they use many phrases in common; they expand and condense at the same points; such facts intimate that very definite and potent influences operated in common upon all three. This solicits explanation. But they also strikingly differ; these differences are commanding and broad. Luke has much unique material; Matthew distributes his material into coherent masses; Mark seems simpler, truer, strikingly independent. These variations also call for explanation. These resemblances and divergences are being traced with minutest carefulness. The aim is to find the facts as to their origin. Which gospel was first; which was next; what were their sources respectively and in common; how are Matthew and Mark, Matthew and Luke, Mark and Luke, related; did any one depend on any other, or upon the other two; did some fourth account, now lost, lie back of these; what was the Hebrew gospel, etc.? These are the leading questions which students are trying to answer. A view widely held at present supposes that Mark preserves to us a document which came to his hand from some source unknown to us; that Matthew preserves to us another document called the Logia; that these two were combined by Matthew in forming his gospel; that Luke also used the Logia, combining it with his own new material. This is the now widely known "two-document" theory. The main efforts here are to define the original full pure form of each of these two documents. Here positions vary manifoldly. Another view urges vigorously that no written documents lay behind any of our gospels. What preceded our written gospels was an era of very careful catechetical instruction. Out of this memorized and crystallized material grew our gospels. This method seems to find a measure of illustration in the oral discourses of the book of Acts. For a historical review of this study see Sanday, 'Expositor' 1891, 'A Survey of the Synoptic Question.'

The study of the origin of the gospel of John is getting to be a science by itself. It has hardly a single thing in common with the debate over the first three gospels. Look at

the fourth gospel carefully. Its progress of events, its relation to Judæa and Jerusalem, its report of the great debates, its miracles, its discourses, its style, its ideas, its very words are all peculiarly its own. Two questions have come to the front. Are its narratives authentic history? Was it written by the son of Zebedee? But other problems are also urgent: When and where and how was it written? What is the sum and drift of its internal evidence? What has been its external history? Has its order of chapters or paragraphs been disturbed? How is it related to the epistles of John, and to the Apocalypse? To list and classify the views that have been held, saying nothing of the literature, would be impossible here. See special article on Gospel of John. Suffice it to say that among scholars, as they strive to give some rational account of these matters, there has been a strong tendency to discount the historical value of this gospel, and to deny its full authorship to the apostle John. But the great heart of Christendom has always felt that it found and felt in the Gospel of John the very presence of its very Lord, as discerned and described by his most profound and intimate disciple. The prime question has always been in plain view. Did the only begotten Son of God become incarnate for our salvation? This is the Johanne question. Upon this prime problem hangs every other. Once state in full and in brief the entire sum and nature, the whole scope and purport of its words, as they stand; note its unity, its homogeneity and its profundity; survey the sweep of its thought; look into its religious purity, its ethical absoluteness, its transparent clarity; sense its overwhelming momentum; observe its entire fluidity, the energy of the whole pouring full from every part; being watchful all the while to see that these impressive qualities, all and single, lie throbbing and shining in this gospel wholly and only because of the clear and full presence of the Christ, whom some author, with an all-absorbing devotion, has endeavored to unveil—and one must conclude and exclaim that here is no human invention, no poetic embodiment of any earth-born type of thought; but rather the declaration and disclosure, by an anointed and enraptured eyewitness, of his own full and immediate vision of the heavenly glory of Jesus Christ, the only begotten and incarnate Son of God. At any rate it can be boldly said that a discussion of the origin of the Gospel of John, to say nothing of the other three gospels, deals with the inmost essence of the subject of this essay.

Some special mention of the book of Acts is also needful in any statement of the genesis of New Testament writings. Here is an authority of the first rank and importance. It is our sole reliable record of the earlier days of the Christian Church. It defines and presents the actual process of the transition from the life and time of Christ to the Apostolic Age. Its references to geography, and archæology and politics and civil administration and customs, all presented with singular minuteness, at the same time expose it to the sharpest tests of historical criticism and establish its singularly full trustworthiness. Written without much doubt by Luke, a personal friend and companion of Paul, and a man of painstaking

accuracy, it offers from chapter 20:5 on, and also in chapter 16, the testimony of an eyewitness; from chapter 12 on, a record of firsthand knowledge; and in its first 12 chapters a compilation from sources which he was in a peculiarly good position to obtain and inspect with the aid of first rate authorities. But problems beset the book. The leading of these concern the day of Pentecost; the relation of the speaking with tongues in Acts 2 to that in I Corinthians 14; the relation of chapter 15 to Galatians 1 and 2; the sources of the book; the authorship; the text; and the speeches. In particular, certain scholars impugn chapters 1-7, and all records of miraculous events. But in the main these are matters that lie beyond the range of precise historical outside proof. Hence theories may continue to abound. But sober views must contend that here is a faithful reflection of the primitive Christian days, from the hand of an alert and competent historian who wrought under the immediate influence and presence of apostolic men, in the very midst and upon the very ground of the scenes which he reports.

One other section demands mention in this study of the genesis of the New Testament—the Apocalypse. The surface aspect of this book is bewildering. Its historical allusions are the puzzle of the ages. Interpretations are a crazy medley. But statements of another nature may also be made. This book belongs to a class. It is one of many. In fact it marks a world current. Taken altogether, the outpour of Apocalyptic literature is a phenomenon of noteworthy persistence. It springs up repeatedly in Old Testament life. A striking instance is Daniel. It wells up frequently in the speech of Christ. Many would deny all such ideas to him. But this is rash and violent in the extreme. His conscious connection with Daniel cannot be impugned. His own apocalyptic utterances must be allowed. Then the teachings and experiences of Paul cannot be erased. Thus much touching form. But once one penetrates beneath the form, and confronts the inner message of every Biblical apocalypse,—he is a rash assailant who would assume to undo its word. This is pre-eminently true of the Apocalypse of John. It is a book of impregnable strength. Its central theme is the world struggle between the true God and his blasphemous counterfeit for the worshipping allegiance of mankind. This is the one inmost and uppermost errand and office of the book. Specially in chapters 12-22 the evolution and description of this conflict stand forth in stupendous strength. The true God, the living God, the creator God, the spirit God, sole Lawgiver, Judge and Saviour of angels and men, holy, infinite and pure; the suffering and glorified Christ, mighty, gracious, and true; with their innumerable, worshipping, devoted human and angelic hosts, on the one side—the Dragon and Beast and pampered Queen, full of blasphemy, treachery, cruelty, and lust; with their hosts of devotees to every sordid lust, on the other side, representing all the personnel, good and bad of a teeming universe, surge and strive unto issues of eternal life and eternal death amid the scenes of this mysterious book. It is a volume of life in which the awful struggles within the realms of religion and ethics attain their ultimate culmination. It fixes for-

BIBLE

ever the issue toward which all the teachings of the Bible tend. Here, as nowhere else, the solemn undertone of the entire volume sounds forth in full expression. Here the full majesty of God, the full enormity of sin, the full anguish of guilt, the full felicity of grace stand clear. Here the inner structure and substance of true morals and religion are shown and seen to be imperishable. However mysterious and confusing the outer guise of this incomparable book, whatever historical allusions its various enigmas may really intend, whoever its author, whencesoever its sources, and whatever the motive stirring its writer's mind, its inner teaching, simple and sublime, concordant, inclusive, and pure, forms the crown and marks the consummation of all for which the Bible most distinctly stands. Its nature befits its place. It well corresponds to the mysteries and enduring strength that mark the opening chapters of the book standing at the beginning of the Biblical list. It is a book of issues. A study of its genesis leads back into a deep and far-seeing study of the real inner meaning of all the volume which it concludes. Thus much needs saying about its inner value.

Critical study of the origin of this book has in recent years taken a new turn. This study deals distinctly with its apocalyptic features, and its historical intimations. It has pursued two marked courses, one that of literary, the other that of historical criticism. The latter is at present paramount, and bids fair to hold the first place. It consists in an effort to trace, through a study of the world's apocalyptic literature, the actual historical genius of the forms found in this work ascribed to John. This work is as yet but fairly begun. Till it is done efforts at final estimates are vain. The nature and field and status of this study may be seen in Bousset, 'The Antichrist Legend.'

XI. *Canon of the New Testament.*—This study seeks to trace the actual historical acceptance of the New Testament writings by the Church as a recognized body of sacred literature, worthy to stand alongside the Old Testament. One has to begin with 140 A.D. Witness as to this date is very meagre and indefinite. The data are from the epistle of Clement to the Corinthians, the II Epistle of Ignatius the Epistle of Polycarp, the Didache, the Epistle of Barnabas, the Shepherd of Hermas, the writings of Justin Martyr. Some of these testimonies date later than 140 A.D. by a few years. But they stand so near that date as to form fair testimony as to that era. The evidence is mostly by way of allusions to sayings found in our New Testament writings; and not in the form of direct citation or mention. But these allusions and references are sufficiently numerous and suggestive to support quite firmly the supposition, which otherwise seems most natural, that our New Testament writings were at that date widely known and honored. In a few cases the exact words of our gospels were used by these early writers, as a quotation from the Lord's Prayer, and from his words in Gethsemane. In some cases New Testament writings are mentioned, as Paul's epistles, I Corinthians and Philippians. One writer refers to the words of Christ in Matthew 22:14 as Scripture. In particular the work of Papias is important. His words shed light on the period prior to 140 A.D. He explicitly attests "writ-

ings" as of Apostolic value, one from Peter through Mark, and one from Matthew. He also seems to have known of other writings from the hands of Peter and John. See Eus. 'Hist. Eccl.' iii. 39. The words of Justin are of the greatest value, though still indeterminate. He alludes repeatedly to 'Memoirs of the Apostles.' He uses the word "Gospels." He traces these writings to the "Apostles and those who followed them." He seems certainly to have had in hand our first three gospels. Some important elements of his work seem almost as surely traceable to the Gospel of John. He alludes to Paul's epistles as standard. He also names John's Apocalypse. Marcion also apparently knew and used Luke, and accepted 10 epistles of Paul, namely, Galatians, I and II Corinthians, Romans, I and II Thessalonians, Colossians, Philemon, Philippians, Laodiceans. Statements like the above are as definite as can be made about our New Testament prior to 150 A.D. The fullest testimony within the Church is from Justin Martyr. He bears witness that a New Testament canon was in vogue in his day, having fully equal validity with the Old Testament. How far back can this condition be supposed to date; and how many books were included. Zahn says that our four gospels and the 13 Pauline epistles were widely circulated as collections at the latest about 125 A.D. Harnack declares this unsupported by historical evidence.

200 A.D. In stating in general the situation of the New Testament canon at this date the chief witnesses are Tatian, Irenæus, Clement of Alexandria, Tertullian, Hippolytus, the Muratori canon. These sources make many features stand clear. Tatian prepared from our four gospels his Diatessaron. Irenæus attests all our New Testament books except Philemon, II Peter, Jude, specially emphasizing the value of the four gospels. He calls these New Testament writings the "pillar and ground of the faith." He combines them with the Old Testament as upborne by the same spirit. Clement of Alexandria distinctly attests the same writings as sacred writings, including II Peter, Jude, and Hebrews. Tertullian made abundant use of our New Testament writings as holy writings, excepting that he is silent about II Peter and II and III John, and sets Hebrews, I Peter, and Jude into a second rank. The Muratori Fragment makes a sharp definition of canonical books. It includes the four Gospels, Acts, 13 epistles of Paul, I and II John, Jude; and omits Hebrews, I and II Peter, III John. At this period, as in the earlier era, certain writings, not now held canonical, notably Barnabas, Shepherd of Hermas, and Apocalypse of Peter, seem to have stood near to sacred Scripture in Christian respect. For this era the Syriac version yields peculiar material. It accepts Hebrews, but omits II Peter, II and III John, Jude, and Revelation. In brief, at 200 A.D. our four Gospels, Acts, 13 epistles of Paul were established universally in supreme respect as sacred Scripture with the old Testament.

200 to 323 A.D. In this era two names call for mention. Origen, who died 254 A.D., has left quite outspoken statements. The most valuable are in Eus. H. E. VI. 25. He gives the four gospels sharp definition as unique and canonical. He exalts the works of Paul without numbering his books. He declares I Peter

"acknowledged," and II Peter as in circulation. He includes Revelation and I John, mentioning II and III John as not held "genuine by all." He discusses at length on Hebrews, honoring its contents, but wondering about its authorship. In other passages he includes Acts as by Luke, and credits 13 epistles to Paul, and uses James and Jude. One striking feature is Origen's distinctions. He speaks of some books as "not spoken against," of others as not held "genuine" by all, of another as "acknowledged," a term which he also applies to all the "Apostolic writings."

Eusebius in H. E. III. 25 gives a classified list, aiming to summarize the views of the whole Christian period to his day. He gives the four gospels, Acts, 14 epistles of Paul, I John, I Peter, and Revelation. These he called "acknowledged." He then names James, Jude, II Peter, II and III John as "disputed." He names next "Acts of Paul," Shepherd, Revelation of Peter, Barnabas, Teachings of the Apostles as "spurious." Here is notable testimony. It is representative. It is discriminating. It contributes toward conclusions. It shows a universal, undoubted canonical standard. It shows cautious study and practice. It shows that precisely our present canon was held at that time, and we cannot be sure how early or how far his testimony reaches. And it shows that writings now finally rejected were then rejected. This is one of the chief landmarks in the history of the New Testament canon.

323 to 397 A.D. Constantine gave standing to the Christian Church. He revered and disseminated sacred Scripture. Conflicts with heretics made outlines precise. The canon, accordingly, became clear and took final form. Doubts vanish. The word "canon" comes into vogue. The Synod of Laodicea, about 360 A.D., has been said to have left a list, in its 60th canon. At any rate it belongs in this period. It gives the present Protestant canon for Old Testament and New Testament, only omitting Revelation. This omission was characteristic of the Eastern Church at this time. In the West, Hilary and Rufinus held to this canon. Augustine and Jerome also fixed upon our present list, though recognizing that some books were challenged. The formal concluding steps were taken authoritatively for the Western Church at the third Council of Carthage, 397 A.D. In 495 A.D. Bishop Gelasius I. of Rome put forth a synodical verdict as a decree adopting the list and fixing the order of the New Testament canon as we have it to-day. In 691 A.D. this was adopted for East and West by a universal council.

XII. *Text of the New Testament.*—Up to the time of Constantine the fortune of New Testament Scriptures was precarious. We know too little about it all. But Christians were largely poor, often persecuted, sadly scattered and altogether unable to solidify and maintain in permanent form all the elements and instruments of their life. We have no original New Testament manuscripts. We have no copies from the first three centuries. When Constantine accepted Christianity, among other things, he ordered Eusebius to prepare 50 copies of the Scriptures for the churches of Constantinople alone. From that century manuscripts begin to appear, two being preserved to our day. Two more date from the 5th century. From

the 6th century 27 documents have come to our time. From the 7th century 8 small fragments. These authorities and many more of later days restore to us our New Testament text. Aid is also rendered by versions. Chief of these are the Syriac and the Latin. Further aid comes from the Church fathers. The text which lay underneath our authorized English version was based on very inadequate knowledge and study of textual authorities. In later years this study has become a noble science. In most recent years its prosecution has taken a turn of phenomenal meaning. Scholars are trying to group textual authorities. In this impressive undertaking Westcott and Hort are leaders. They seek to classify sources into families, and so to be able to estimate manuscript values. In this process one group is called "Syrian," including a great number of authorities, but all alike being of low value. Another group is the "Western." Of this the leading manuscript is D, Codex Bezae, so-called. This group is remarkable for freedom, specially for adding otherwise unknown material. Another group is the "Alexandrian." This group is of minor weight. The fourth group is called "Neutral." This is believed to represent most nearly the original New Testament. Its leading authority is B, the Codex Vaticanus, so-called. This is the oldest and weightiest manuscript we have.

This raises the whole question of the relative worth of manuscripts. It may be surely expected that this problem is by no means solved. It is little more than opened.

Independent workers are challenging the positions of Westcott and Hort. But after all is said and done, our New Testament text is mainly assured. "The great bulk of the words of the New Testament stand out above all discriminative processes of criticism, because they are free from variation, and need only to be transcribed. . . . The words in our opinion still subject to doubt can hardly amount to more than a thousandth part of the whole New Testament. See Westcott and Hort, 'Principles of Textual Criticism.'

Manuscripts of the New Testament.—Four manuscripts deserve emphatic mention, as they are prime sources for both Old Testament and New Testament. Codex Alexandrinus, named A, dates probably from the 5th century. It contained originally the whole Bible in Greek, also the two epistles of Clement. At present it is mutilated. Parts of Genesis, I Kings, and Psalms, most of Matthew, parts of John and II Corinthians are lost. It is now in the British Museum. It came from Constantinople to England in 1627. As an authority it rates lower than the two next named.

Codex Vaticanus. B.—This dates from the 4th century and contained originally the whole Greek Bible. This is deemed by many the oldest and most precious manuscript known. It is in the Vatican library at Rome, since 1450 A.D. In its present state it lacks portions of Genesis, II Kings, Psalms, Hebrews, the Catholic epistles, and all of Revelation. Its text had predominant influence with Westcott and Hort and with the revisers of our English Bible.

Codex Ephraemi. C.—This dates from the 5th century. Originally it contained the whole Greek Bible. It is now in the National Library

BIBLE

in Paris. Early in the 16th century it was brought to Italy from the East. It was taken to Paris by Catherine de Medici. At present it is a palimpsest and only a fragment, having only a small part of the Old Testament and barely more than half of the New Testament. It is of great value.

Codex Sinaiticus. Aleph.—This dates from the 4th century. It now exists in two parts: one, of 43 leaves, in the Court Library in Leipzig; the rest in the Imperial Library in St. Petersburg. It originally contained the whole Greek Bible. But now the Old Testament is in fragments. The New Testament is complete. This is the manuscript that was found by Tischendorf under such thrilling experiences in the monastery of St. Catherine at Mount Sinai. It is of priceless value as a witness to the New Testament text.

Codex Bezae. D.—This manuscript originated perhaps in the south of France in the 6th century. It is now in the University Library at Cambridge, being the direct gift of Beza in 1581. It contains the Bible in two languages, Greek and Latin. The relation of these two texts to each other is a very curious and unsolved problem. As a witness it has to be used with great caution. Its New Testament text contains only the Gospels and Acts and a few verses from the Catholic epistles. Its most striking and puzzling feature is its strange omissions, and still stranger quite extensive additions.

The above named are the leading manuscripts. These are all written in large letters called uncials. Of these there are over 100. Many more, considerably over 2,000, are written in smaller letters and in a more running style, and so are called cursives. For further statements consult the *Variarum Bible*.

XIII. Versions of the New Testament.—Of these the Syriac would naturally date early. Until toward the middle of the last century all supposed the so-called Peshitto, or common version, to be the one and only Syriac translation of Scripture. In 1842 manuscripts came to view suggesting another and perhaps earlier version. Since that time there has been much debate over the problem of two versions in Syriac. Of late new light has come, and again from Mount Sinai. Here in 1892 two ladies found a palimpsest of a Syriac version which may possibly be older than either. This debate is destined to continue for some time. Of these versions the Peshitto is the great standard version of the Syriac Church. It has been current and in general use from the 4th century. We know of 177 manuscripts, gathered from the Nitrian Desert in Egypt, and now in the British Museum. This version does not include II Peter, II and III John, Jude, and Revelation. Other Syriac versions have been made.

Egyptian Versions.—These must have begun to originate by 300 A.D. At present five are known. The Memphitic represents lower Egypt, where the dominant dialect was at home. Here are complete copies of the New Testament found. Over a hundred manuscripts have been examined, all of late date, the oldest from 1173. Its text is surprisingly good. The Thebaic version was current in upper Egypt. It probably originated somewhat later than the Memphitic. It exists only in fragments, though

many of them are very old manuscripts, some dating possibly into the 4th century.

Armenian Version.—This originated in the 5th century. It was made from mixed texts, Greek and Syriac. Its earliest manuscript dates from the 8th century.

Gothic Version.—This was made by Ulfilas in the 4th century directly from the Greek. Now it is in fragments.

Old Latin Version.—This was made, perhaps, in Africa about 150 A.D. Scholars trace rival translations and classify them as African, European, and Italian. These were supplanted by the Vulgate. Textual study of this early version is of peculiar interest, disclosing, as it does, a very free treatment as characteristic of that time, and containing what is called the "Western" text.

Vulgate.—This is a work undertaken by Jerome at the order of Pope Damasus in 382. At first he merely revised the Old Latin, working on the Gospels. Then he developed the rest of the New Testament. His Old Testament work was much later and more thorough-going. Manuscripts of the Vulgate exist everywhere in Europe. The best is the Codex Amiatinus. The text of this version has been in very bad condition, and it is very difficult to restore. The work is in progress. This is the standard Bible of Latin and Roman Catholic Christendom everywhere.

XIV. History of the Bible as a Whole.—Jerome's influence through his Vulgate version and through separation of the Apocrypha from the canon was far-reaching. In the 16th century the Roman Catholic and Protestant Churches took different courses. The Roman Catholic Church in its Council of Trent in 1545, adopted the Old Testament Apocrypha as an integral part of the Old Testament canon. The Lutheran party, after some indecision, settled down by usage upon the pure and full Biblical canon as held by us to-day, though during the process there was free discussion of the value of the parts that we have found under dispute. The same holds true of the Swiss or Reformed party. Through them, and by way of the Westminster Confession of Faith, we have received our present body of sacred Scripture.

Previous to this the Bible had made its way to England. About 670 A.D. Caedmon made a paraphrase in verse of the Bible narrative in Anglo-Saxon. Before 800 Aldhelm had translated the Psalms into English. In 735 Bede finished, with his life, a version of John. King Alfred also did some work of this kind. But of these nothing surely remains. Numerous other translations of parts of the Bible were made later. Of some of them manuscripts remain.

Wycliffe's first translation dates from 1380-2. This was a composite work. Soon after his death this was revised; and this revised Wycliffite Bible became the current version. About 170 copies are known. This is the first known complete English Bible. Though of untold value, it was not a scholarly work, being based upon a poor Latin translation.

In the 15th century printing appeared, November 1454. In the same century, and at about the same time the Turks took Constantinople and scattered scholars out of the East, with their learning and treasures, over Europe. Out of this revival of learning and printing came mighty sequels for the Bible. Translations and

copies now could multiply. In England several versions need mention.

In 1525 Tyndale completed in Hamburg his translation of the New Testament. Despite strenuous efforts to destroy it, copies multiplied. But most of them have perished. This version, variously revised, is the influence lying most potently underneath the present King James Bible, and through it our English tongue has gained and retained not a little of its peculiar charm.

Other translations are Coverdale's, undertaken at the request of Cromwell, dedicated to Henry VIII., covering the whole Bible, and published in 1536; Matthew's, really a completion of Tyndale's, made under favor of the king, finished in 1537; the Great Bible, a grand, authorized edition of Matthew's, under Cromwell's patronage, by the hand of Coverdale, published in 1539 and set up in every church; the Genevan Bible, prepared in Geneva by English refugees under the influence of Calvin and Beza and published in 1560; the Bishop's Bible, prepared under the patronage of Elizabeth and the editorship of the Archbishop of Canterbury for the English Church, and printed in 1568; and the Roman Catholic or Douay Bible made from the Latin Vulgate for the Roman Catholic Church, and published 1582 and 1609. Of these the Genevan Bible had the widest influences; it was the first entire English Bible to adopt the division of chapters into verses.

Authorized Version.—This work was produced under the patronage of King James I. at the suggestion of the Church leaders. About 50 scholars were engaged in the work, arranged in six groups. They used Beza's Greek Testament of 1580 for the New Testament. The Bishop's Bible formed the English basis, though the Genevan and Douay versions had much influence. Through the Bishop's Bible Tyndale still made his power felt. This version was published in 1611 to become the standard form of sacred Scripture for over 200 years for the entire English race. Its influence upon literature and life can never be told.

Revised Version.—Increase of knowledge of Biblical lore since 1611 made a revision imperative. This work was proposed officially by the Established Church of England in its Convocation of 1870. Rules were laid down governing the translation, enjoining use of best text, faithfulness to the original meaning, and as few alterations as possible. Two companies were formed, of 27 members each, selected from various denominations. These were supplemented by a body of American scholars, whose results, when not adopted by the English body, were incorporated in an appendix. The work began in 1870. The New Testament appeared in 1881, the Old Testament in 1884. The changes from the version of 1611, while very numerous (Dr. Kenyon records that the Greek New Testament of 1881 differs from that of 1611 in 5,788 readings, of which about one quarter are a notable change) are prevailingly in matters of minor moment.

American Version.—In 1901 the surviving members of the American committee, appointed by the English committee in 1870, published an edition of the English Bible in which the opinions of the American members of the revision hold first place. In this edition there are several notable improvements in the way of faithfulness and modernness and facility in

use. Chief among these is the new list of marginal readings.

German Versions.—Luther's is the standard, though many translations appeared before his. He translated directly from the Greek and Hebrew, putting out 10 editions during his life. In 1863 the Evangelical Church Diet set afoot a revision of Luther's Bible. Specially to be mentioned for scholarly value are Weizsäcker's German translation of the New Testament; and the translation of the Old Testament conducted by Kautzsch and completed in 1894.

French Versions.—The chief early version is that by Olivetan in 1535. In 1588 a revision was made at the suggestion of Calvin and under the lead of Beza. This has been the standard French Bible. A new translation by Segond 1874-9 is now most widely used.

The standard Dutch Bible, called the States Bible, is a translation authorized in 1624 by the States-General of Holland, and completed in 1637.

To-day there exist at least 108 translations of the entire Scriptures. If partial translations are added, the total will nearly reach 500. In this work the past century has been a phenomenal era. It has seen the Bible put into the possession of 1,200,000,000 of people. This is pre-eminently the work of Protestant Christianity. During this past century 80 Bible Societies have come into being, with a multitude of auxiliaries. Of these the leading one, the British and Foreign Bible Society, issues annually nearly 4,000,000 copies.

XV. *Influence of the Bible.*—The persistence of the Bible and its unexampled dissemination command some remark. Its age-long and world-wide promulgation must contribute to extend and fortify its power. But its own original, creative force alone can explain its amazing diffusion and vitality. It proves itself pre-eminently the Book of Life. The sacred Scriptures of no other religion or faith can ever begin to parallel it for the number and value of its manuscripts, the number of its versions, the number of its publishing houses, and the number of its copies actually sold. As literature it is wholly unique. The stamp of its style has fixed the taste of the leading nations of our time. And its manifoldness is quite as wonderful as its excellence. It embodies history and oratory, dialogue and drama, philosophy and poetry, giving every essential form of human literary utterance. It has laws, tragedies, annals, parables, prayers, satires. It contains the epic, the lyric, the ode, the chorus, the oracle, the riddle, the chant, the liturgy, the refrain, the acrostic, the apostrophe, the proverb, the epistle, the philippic.

But it is not the form, pleasing and refining as it is, that holds the secret of the Bible's power. It is always the message that transmits force. The Bible figures always as the Word of God. It engrosses and addresses character. Its moral energies are the sources of its strength. It reveals and declares God. It announces law. It portrays the judge. It stirs up conscience to a final verdict upon human life. It summons the human will. Its heroes are prophets. Its great victors are princes in the moral realm. Its central figure is Jesus Christ. Its typical explorers are apostles. Its closing book is an apocalypse. Its outlook is eternity. These things create and sustain its matchless

style; and these explain and feed its undying life. It has to do with the being and majesty of a holy God, and with the inmost character and uttermost destiny of immortal man. Hence all its excellence and strength.

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Bible, Harmony of the, with Science. The history of science in its connections with the Bible is full of these conflicts between the scientific and theological classes. Both parties have participated in them, as assailants and defenders. Sometimes scientists, after misleading the divine into some supposed scientific interpretation of Scripture, have charged back upon him their own exploded errors, and sometimes divines, after attacking some true theory of the scientists as hostile to Scripture, have gladly accepted it as among their best defenses of the faith.

Astronomy and the Bible.—The first of the seeming conflicts was between astronomy and the Bible. The Psalmist David, who was not a

scientist, had poetically depicted the starry heavens as a spangled canopy wondrously wrought by the divine hand. But the astronomers in later times devised what is known as the theory of Ptolemy, according to which the heavens were composed of vast crystal spheres, one within another, having the sun, moon, and stars attached to them as they revolved around the earth, which was conceived of as a flat, circular plane, immovably fixed at the centre of the system. The divines of the day, docilely accepting this crude mechanism of the scientists, proceeded to celebrate the divine power, wisdom, and goodness which it displayed in producing the wonderful vicissitudes of day and night and summer and winter. Their logic was correct enough in form, but needed to be reinforced with better science. The better science at length came, not indeed from a professed scientist, but from a faithful priest of the Church, Nicholas Copernicus, who modestly broached as a working hypothesis, what is now known as the Copernican theory of the solar system. Galileo, however, who could equal Huxley in sarcasm and invective, published in his scientific journal called 'The Siderial Messenger,' such proofs of the Copernican theory as provoked a bitter controversy with the Church authorities and led to his pretended recantation. It is difficult for us now, with our advanced knowledge, to understand what a radical change was coming into men's opinions. Not only was the solid earth sent spinning through space like a cannon ball, but the entire orthodox conception of heaven and hell was literally revolutionized. The Inferno of Dante, with its descending ranks of lost spirits and demons, could not be contained within such a revolving globe, and his Paradiso, with the saints and angels worshipping the Blessed Virgin and Holy Trinity, vanished from such a receding firmament like sunset clouds. And when Bruno came with his daring speculations concerning other inhabited worlds our little planet seemed too utterly insignificant to be made the scene of a divine incarnation, redemption, and judgment. Every essential article of the faith appeared to be imperiled. It is no wonder that free thinking men of science fared badly in such a conflict with the Roman Inquisition. Galileo was imprisoned as a heretic, and Bruno was burned at the stake as an atheist and blasphemer. But what has been the issue of the conflict? Scarcely a trace of it remains. Gradually the new astronomy has been accepted, not only as true in itself, but as far more accordant with Scripture than the old astronomy of the Hebrew or Greek. Instead of a star spangled tent or an illuminated dome of glass, it has opened an unbounded universe for the illustration of the divine perfections and revealed doctrines. Does astronomy tell us of an immensity of space, with regions beyond regions which we cannot even conceive? The Bible also teaches us that Jehovah inhabiteth eternity, and the heaven of heavens cannot contain Him. Does astronomy tell us of countless orbs, moving with tremendous forces, in fixed orbits, under immutable laws? The Bible also teaches us that He hath ordained the heavens and established in them His power and faithfulness. Does astronomy tell us of wonderful adaptations of planet to sun, with changing zones, and climates, and

seasons? The Bible also teaches us that wisdom was with Him when he prepared the heavens, the sun and moon and stars for signs and for seasons, and that He hath garnished them by His spirit. Does astronomy hint to us of a variety of habitable worlds, with a corresponding variety of intelligent races? The Bible also teaches us of the heavens as the abode of angels and archangels and of a heavenly Father and His house of many mansions. Does astronomy tell us that our earth is akin to other orbs in mechanical and chemical constitution, and suggest that we may be some day knit together with them by ethereal vibrations in psychical sympathy? The Bible also teaches us that the angels desire to look into the mysteries of human redemption, that its manifold wisdom is now made known to principalities and powers in all heavenly places, and that there is rejoicing among them when one sinner on earth repenteth. Let it be observed, I am not now saying that the Bible teaches astronomy, but simply that its teaching is in harmony with astronomy.

Geology and the Bible.—The next seeming conflict was between geology and the Bible. It is certain that Moses did not speak as a man of science in his dramatic vision of the creation, when he described the heavens and the earth, land, sea and sky, plants, animals and man, as produced by divine commands in six working days, ending in a seventh day of rest. The early geologists, however, accepted this sublime vision as a scientific cosmogony, and like-minded divines followed them, magnifying such creative miracles as the formation of the terraqueous globe in 24 hours, the arrangement of its seasons and climates between a single sunrise and sunset, and the marshaling of its vegetable and animal kingdoms by divine fiat from Monday morning until Saturday night in the autumn of the year 4004 B.C. Here again the argument, absurd as it now seems, lacked scientific content rather than logical form. It is within living memory what a shock ensued when that scientific content was furnished, and it was discovered that the earth is of indefinite antiquity, that its continents have emerged from its oceans through long ages of subsidence, and that successive dynasties of plants and animals have flourished and decayed, leaving only a few fossil remains in its crust. The very doctrines of the creation and the Sabbath itself seemed directly assailed, and the defense of them was fierce and desperate. The geologists were not persecuted like Galileo and Bruno; but the most extraordinary makeshifts were devised to evade their conclusions. It was intrepidly declared that the Almighty created the earth in a stratified form with all its fossils, to serve as a trial of our faith. It was ingeniously surmised that the whole prehistoric geology was a chapter omitted in Genesis as not relevant to the purpose of the narrative. It was even fancied that the six days' works were a special miraculous creation in Eastern Asia to fit up a Paradise for the temptation and fall of man. When at length the vast geological periods could no longer be denied, they were forced into correspondence with the Mosaic days, con-

ceived as days of Jehovah, with whom a thousand years are as one day; and elaborate schemes of reconciliation were proposed by such distinguished geologists as Hugh Miller, Dawson, Dana, and Guyot, with which some less distinguished geologists have since made themselves merry. Nevertheless, we are already emerging from these heated discussions with reassured faith. As astronomy has opened unbounded regions of space for the illustration of the divine immensity, omnipotence, immutability and omniscience, so geology has recalled unlimited periods of time for unfolding the divine power, wisdom, and goodness with cumulative richness and fulness. And as astronomy has shed new light upon the revealed doctrine of the heavens and the angels, so geology is confirming the revealed doctrine of an orderly creation and a sabbatical calendar. Though the dramatic days of Genesis be measured in hours or in ages, though the time element be excluded from them altogether, though they be treated as ideal rather than actual, they will still appear as coincident acts of creation and phases of evolution, founded perhaps in the periodicities of nature and expressed in the Fourth Commandment. On comparing them we have, first, a formless waste or the nebulous chaos; second, the earth as divided from the firmament or the planet as parted from the solar nebula; third, the seas and the dry land bringing forth grass and herb, or the terraqueous globe with its photosphere and commencing verdure; fourth, the appearing sun, moon, and stars for signs and seasons, or the mature planet, in the solar system, with its zones and climates; fifth, the swarming of the great fishes and winged fowl, or the production of sea monsters and mammoth reptiles; sixth, the earth bringing forth beasts each after its kind, and the making of man in the image of God, or the evolution of the higher animal and human species; seventh, the divine day of rest, or the tranquil historic period. The correspondence, it will be seen, is at least logical, even if not chronological. On the one hand, geology clearly indicates that there have been successive periods of energetic evolution ending in a period of repose and order; and on the other hand, the Bible declares that in six days God created the heavens and the earth, and rested from his works on the seventh day. Geology also tells us of a primitive watery globe, whose glaciers and inundations have ceased since the appearance of man; and the Bible also, after the deluge, speaks of a covenant between Jehovah and the earth for man's sake, that summer and winter, and seedtime and harvest shall not cease. Geology still hints of interior fires which might at any time burst forth in general conflagration; and the Bible still warns latter day scoffers of a day when the earth and all the works that are therein shall be burned up. You may say that this teaching of the Bible is religious rather than scientific; that is not the point—whatever it be, it is in harmony with geology.

Anthropology and the Bible.—We are still in the midst of a seeming conflict between anthropology and the Bible. In the vision of creation man appears as made in the

BIBLE

image of God, with dominion over all inferior nature. Then follows an allegorical picture of the first man, Adam, as formed out of the ground, inspired with a living soul, and placed among the beasts of the field, and the fowls of the air, which had also been formed out of the ground and brought to him to receive their names. The first woman, Eve, his wife, is depicted as fashioned out of one of his ribs while he was in a trance, and the pair were placed in a garden to till it, with liberty to eat of every tree but the tree of knowledge of good and evil. They were tempted to disobedience by the subtlety of Satan in the form of a serpent, and so fell from their state of innocence, entailing the curse of labor, sorrow, and death upon the whole of mankind. It would seem impossible to find any strict anthropological science in this instructive parable; and yet until recently it has been so treated by both scientists and divines, who have held that man was molded by the divine hand as a lifeless clay image among living plants and animals; that he was endowed with psychical faculties and God-like qualities in a few minutes or hours, and that the man Adam was the sole progenitor of all the savage and civilized races of Asia, Europe, Africa, and America. But scientists are now urging some very different theories of human origin and development. We are told by paleontologists and ethnologists that man was but the product of the whole evolution of organic nature; that his remote ancestor was a man-like animal or anthropoid ape; that next came a succession of pre-Adamite races, of which the Hottentot, the Patagonian, and the Esquimau may be the survivors; that there have also been co-Adamite races as indigenous in other continents than Asia as the plants and animals with which they are there found associated; that all civilized races, including the Adamite, or Caucasian, have risen from savagery, with improving implements and arts, through long epochs of stone, of bronze, and of iron, and have a prospect of indefinite improvement in the future. In spite of theological prejudice and some instinctive repugnance, we have begun to entertain these theories, and may already provide, if need be, for their acceptance. As astronomy and geology have afforded new illustration of the physical attributes of Jehovah, so anthropology is unfolding His intellectual and moral attributes, in the structure of both body and soul, and may in like manner be adjusted to the revealed doctrines of human depravity and the divine image. The essential truths in the allegorical story of Eden will stand unimpaired, whether we view man's sinfulness as a primitive lapse or as a present condition; whether we regard his ideal Godlikeness as impressed upon him thousands of years ago or as still in process of development. If anthropologists shall prove that primeval man, physically considered, was evolved from pre-Adamite and anthropoid races as a half-animal savage in a state of nature; that he slowly developed psychical powers and religious beliefs; that while many breeds of men remain debased and deteriorated the Caucasian breed, both Hebrew and Christian, has been steadily advancing in knowledge, virtue, and religion, and that the perfected

man of the future, with growing arts and sciences, may yet transform the globe and even bring it into connection with other worlds and races. If the anthropologists, I say, shall prove all these things, the Bible will teach, in correlation with them, that the first man Adam was of the earth, earthy, placed in a fruitful garden, associated with the animals, but with dominion over them; that God breathed into him a living soul and made him after His own image; that as in Adam all die, so in Christ shall all be made alive, and as we have borne the image of the earthly, so also shall we bear the image of the heavenly, and that the man of prophecy, as renewed after the image of Christ, the Lord from heaven, shall yet inhabit the new heaven and the new earth, wherein dwelleth righteousness. And still, too, will such teaching of the Bible, though unscientific, be found to be in harmony with such facts of anthropology.

Archæology and the Bible.—And now we are entering a seeming conflict between archæology and the Bible. The historical books, with no show of historiographic art, record the fortunes of the peculiar people of Israel as descended from the patriarchs, Abraham, Isaac, and Jacob, as worshipping Jehovah in distinction from the false gods of the heathen around them, as returning even from their captivities in Egypt and Babylon with a fresh reassertion of their own creed and ritual, and as ever looking forward to the Messiah, Christ, in whom their whole religion was at length absorbed and fulfilled. Philosophical historians, as well as learned commentators, have hitherto accepted these simple annals as accurate and trustworthy. Of late, however, some discredit has been cast upon them by certain archæologists, who claim that the inscriptions on the tablets unearthed at Babylon bear suspicious resemblances and affinities with Biblical stories of creation and paradise. The American Professor Hilprecht, with the true scientific spirit, declines to make such invidious comparisons, and declares that the Babylonian polytheism stands in contrast with the Hebrew monotheism. But the German Professor Delitsch hastily infers from them that the Hebrew monotheism was no better than Babylonian polytheism, and jumps across the following centuries to the conclusion that our Saviour himself thus depreciated the Jewish religion. Meanwhile, the German Emperor William, after admonishing the learned antiquarian professor to stick to the Babylonian tablets, without drawing theological inferences, proceeds to give his own somewhat conservative views of the theology of the Old and the New Testaments. It is a very interesting controversy. But suppose we should concede, for the sake of argument, all that the theological archæologists are trying to prove,—grant that the inspired vision of creation and the divine allegory of Eden may have some crude counterparts in the corresponding myths and legends of Babel—is it quite inconceivable that both have descended, the one in a pure and the other in a corrupted form, from the same primeval revelation in the dim period before the flood? Are not the Hebrew Scriptures one continual

BIBLE — BIBLE STATISTICS

protest against the religious errors of surrounding nations, and have they not at the same time infinitely surpassed them in the religious truths which they have unfolded? Is it any more incredible that Judaism should have been developed out of, or in spite of, preceding religions than that Christianity should have been developed out of or in spite of Judaism, both of them under that wonderful Providence which has educated the chosen races of mankind? Moreover, it has distinctly taught that both Judaism and Christianity, after their isolation and pupilage, were destined to universal prevalence; that in Abraham all the families of the earth would be blessed, and Christ himself be revealed as the desire of the nations. And the Gospel, therefore, was proclaimed among the Gentiles as well as among the Jews. St. Paul, too, the Apostle to the Gentiles, when preaching to the Athenians, insisted upon the consensus of Christianity with their religion in those great theistic beliefs which were taught by their own poets and philosophers, and which are common to all mankind. And, as Christianity, clad in civilization, is now going forth among the religions of the world reclaiming their truths and rejecting their errors, she is simply fulfilling her mission as the one absolute and universal religion—the faithful saying, and worthy of all acceptance, that Christ came into the world to save sinners.

I do not forget how much the question is complicated by the views of a radical school of the higher critics who maintain, on literary grounds, that the Old Testament Scriptures themselves betray that mythical and legendary origin which some archaeologists would ascribe to them. Many of the conclusions of this school are based upon unverified conjecture and continual asseveration. But it may be well to accept them hypothetically, in order to state the whole problem of opinion. Assume then, if you like, that the books of the Pentateuch or Hexateuch were not written by Moses, but were a sort of mosaic of pre-existing documents written by unknown scribes and collected by unknown redactors or editors, as we now possess them. Assume also that the Biblical stories of creation and paradise in their literary form are anthropomorphic, dramatic, allegorical, and unhistorical. Assume still further that in these respects they bear some external resemblance to the creation-myths and paradise-legends of other Eastern peoples. Prove all this, if possible; and yet you will not have destroyed the incontestable fact that these ancient writings contain an objective revelation from God to man which is infinitely superior in kind and degree to any supposed revelations in the religions of Babylon, Nineveh, Assyria, Egypt, Greece, and Rome; and which even as to literary form surpasses any other sacred books, ancient or modern. Nor will you have lessened the evidence which the Bible thus affords of growing harmony with the very sciences of archaeology and philology which are now arrayed against it.

In this article I have sketched in a popular manner those physical sciences which have seemed to be in conflict with revealed religion, because such sciences just now are most popular in their impression and most likely to

disturb existing faith in the inspiration and authority of the Holy Scriptures, and because they are the most advanced sciences. The argument might be carried up into the higher sciences of psychology, sociology, and the science of comparative religion, but such sciences, as yet, are not so mature nor in so apparent conflict with the Scriptures. It will be seen that the argument is strongest where science is most clear and full. It is also cumulative, and already, I trust, warrants the belief that when science shall have reached the utmost goal of its development it will still be, as it always has been, in harmony with the Bible.

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Bible, The Polychrome. A new translation of the Scriptures from a revised text, by eminent biblical scholars of Europe and America; Professor Paul Haupt of Johns Hopkins University, editor, with the assistance in America of Dr. Horace Howard Furness. The special scheme of this great work is its use of color backgrounds upon which to print the various passages by different writers which have been made up into one work, as Isaiah or the Psalms. It is not based on any doubt of inspiration, but on the general conviction of biblical scholars that only good can come from making perfectly clear to the public the full results of modern critical research.

Bible Statistics, an interesting compilation, said to be the fruits of three years' labor by the indefatigable Dr. Horae, and given by him in his introduction to the study of the Scriptures. The basis is an old English Bible of the King James version.

Old Testament.—Number of books, 39; chapters, 929; verses, 23,214; words, 593,493; letters, 2,728,100.

New Testament.—Number of books, 27; chapters, 260; verses, 7,959; words, 181,253; letters, 838,380.

The Bible.—Total number of books, 66; chapters, 1,189; verses, 31,173; words, 773,746; letters, 3,566,480.

Apocrypha.—Number of books, 14; chapters, 184; verses, 6,031; words, 125,185.

Old Testament.—The middle book of the Old Testament is Proverbs. The middle chapter is Job xxx. The middle verse is 2 Chronicles xx., between verses 17 and 18. The shortest book is Obadiah. The shortest verse is 1 Chron. i. 25. The word "and" occurs 35,543 times. Ezra vii. 21 contains all the letters of our alphabet. The word "Selah" occurs 73 times and only in the poetical books. 2 Kings xix. and Isaiah xxxvii. are alike. The Book of Esther does not contain the words God or Lord. The last two verses of 2 Chronicles and the opening verses of the Book of Ezra are alike. Ezra ii. and Nehemiah vii. are alike. There are nearly 30 books mentioned, but not found in the Bible, consisting of civil records and other ancient writings now nearly all lost. About 26 of these are alluded to in the Old Testament.

New Testament.—The middle book is 2 Thessalonians. The middle chapter is between Romans xiii. and xiv. The middle verse is Acts xvii. 17. The smallest book

BIBLES — BIBLIOGRAPHY

is 2 John. The smallest verse is John xi. 35. The word 'and' occurs 10,684 times. The name Jesus occurs nearly 700 times in the Gospels and Acts, and in the Epistles less than 70 times. The name Christ alone occurs about 60 times in the Gospels and Acts, and about 240 times in the Epistles and Revelation. The term Jesus Christ occurs 5 times in the Gospels.

The Bible.—The middle book is Micah. The middle (and smallest) chapter is Psalm cxvii. The middle verse is Psalm cxviii: 8. The middle line is 2 Chronicles iv. 16; the largest book is that of the Psalms; the largest chapter is Psalm cxix. The word Jehovah (or Lord) occurs 6,855 times. The word 'and' occurs 46,227 times. The number of authors of the Bible is 50. The Bible was not until modern times divided into chapters and verses. The division of chapters has been attributed to Lanfranc, Archbishop of Canterbury, in the reign of William I.; but the real author of this division was Cardinal Hugo de Sancto-Caro, about 1236. The number of languages on earth is estimated at 3,000; the Bible or parts of it have been rendered into only about 180, or, languages and dialects together, 345. The first English translation complete of the Bible was by Wyclif in 1380. The first American edition was printed in Boston in 1752.

Bibles, The Seven, the seven principal Bibles of the world are the Koran of the Mohammedans, the Eddas of the Scandinavians, the Tripitikes of the Buddhists, the Five Kings of the Chinese, the three Vedas of the Hindus, the Zend Avesta, and the Scriptures of the Christians. The Koran is, except the Eddas, the most recent of these seven bibles and not older than the 7th century of our era. It is a compound of quotations from the Old and New Testaments, the Talmud and the Gospel of St. Barnabas. The Eddas of the Scandinavians was first published in the 14th century. The Tripitikes of the Buddhists contain sublime morals and pure aspirations, but their author lived and died in the 6th century before Christ.

The sacred writings of the Chinese are called the Five Kings, the term king meaning web of cloth or the warp that keeps the threads in their place. They contain the best sayings of the best sages on the ethico-political duties of life. These sayings cannot be traced to a period higher than the 11th century before Christ. The three Vedas are the most ancient books of the Hindus, and it is the opinion of Max Müller, Wilson, Johnson, and Whitney that they are not older than 11 centuries before Christ. The Zend Avesta of the Persians is the grandest of all these sacred books next to our Bible. Zoroaster, whose sayings it contains, was born in the 12th century before Christ.

Biblia Pauperum (Bible of the poor), the name for block books common in the Middle Ages, and consisting of a number of rude pictures of Biblical subjects with short explanatory Latin text accompanying each picture. A similar work, but more extended and with rhymed text, was the 'Speculum Humanæ Salvationis' or 'Mirror of Human Salvation'. Prior to the Reformation these

two books were much used by the preaching monks, and as such orders as the Franciscans, Carthusians, etc., were styled 'Pauperes Christi,' the first named book, so popular with them, came to be known, therefore, as the 'Biblia Pauperum'.

Biblical Criticism, the science which has for its objects (1) to decide which books are entitled to a place in the Scripture canon, and (2) to bring the text of these canonical books to the utmost possible degree of purity. In prosecuting the first of these aims, the Biblical critic must not be confounded with the Christian apologist; the function of the former is a strictly judicial one, while the office of the latter is that of an advocate. One important subject of investigation is as to what Old Testament books were recognized as divine by the ancient Jewish Church or Synagogue; as also what New Testament books were at once and universally welcomed by the early Christian Church, and what others were for a time partially rejected, though they ultimately found acceptance everywhere. In seeking to purify the text, the Biblical critic must do much toilsome work in the collation of codices or manuscripts. He does not put the whole of these on one level and admit whatever reading has a majority of manuscripts in its favor; but attempts to test the value of each one apart, forming an hypothesis if he can as to when, where, and from whom it emanated, and from what other manuscripts it was copied at first, or in technical language, to what recension it belonged. See *BRILL*.

Bibliography, a term signifying the knowledge of books, in reference to the subjects discussed in them, their different degrees of rarity, curiosity, reputed and real value, the materials of which they are composed, and the rank they ought to hold in the classification of a library. It is therefore divided into two branches, the first of which has reference to the contents of books, and may be called, for want of a better phrase, *intellectual bibliography*; the second treating of their external character, the history of particular copies, etc., may be termed *material bibliography*. The object of the first branch is to give information regarding the most valuable books in every department of study by means of catalogues.

Bibliography has been, and still is, cultivated most successfully in France. This is owing partly to the riches of the great and daily increasing public libraries, liberally thrown open to the use of the public, partly to the large number of fine private collections. Brunet's well-known 'Manuel du Libraire' was the first important work which contained, in an alphabetical form, a list of the most valuable and costly books of all literatures; Barbier's 'Dictionnaire des Ouvrages Anonymes,' the first systematic and satisfactory treatise on this subject; Renouard's 'Catalogue d'un Amateur,' the first, and for a long time the best guide of the French collectors; the 'Bibliographie de la France,' the first work which showed how the yearly accumulation of literary works can be recorded in the most authentic manner. No less valuable are the works of Pegibot, Petit Radet, Renouard on the Aldines, and various others. Among more recent French works may

BIBLIOGRAPHY

be cited 'Bibliographie de la France,' a periodical publication commenced in Paris in 1810. H. Bossange, 'Ma Bibliothèque Française' (1855), gives a list of standard editions of the best French authors. I. M. Quérard, 'La France Littéraire ou Dictionnaire Bibliographique,' an account of the literature of the 18th and 19th centuries (10 vols. 1827-39); Quérard, 'La Littérature Française Contemporaine' (1827-49); Brunet's 'Manuel du Libraire' (new edition, 6 vols. 1860-5); E. Hatin, 'Bibliographie de la Presse Périodique Française' (1 vol. 1866); Lorenz, 'Catalogue Général de la Librairie Française depuis 1840,' giving French publications from 1840 to 1899.

In England, although it contains many rich public and private collections, bibliography has not been so successfully cultivated as in France. The most extensive catalogues of books of which it can boast are those of the Bodleian Library, the British Museum, the Advocates' Library, Edinburgh, the Harleian Library (compiled partly by Dr. Johnson), etc. Catalogues compiled on a scientific system, by which the reader is assisted in his researches after books on a particular subject, are not numerous in English, but we may mention Sonnenschein's 'The Best Books' (1891), and 'Guide to Contemporary Literature' (1895), presenting classified lists of about 100,000 works. The most splendid catalogue perhaps ever published is that of the Earl of Spencer's Library, compiled by Dibdin, in four large volumes, with numerous engravings. Among English bibliographical works are the 'Typographical Antiquities' of Ames, Herbert, and Dibdin; Adam Clarke's 'Bibliographical Dictionary and Miscellany' (1803-6); Dibdin's 'Introduction to the Knowledge of Rare and Valuable Editions of the Classics' (1827, 2 vols.); Brydges' 'Censura Literaria' (1805), and 'British Bibliographer' (1818); Beloe's 'Anecdotes of Literature' (1807); Savage's 'Librarian' (1808); Dibdin's 'Bibliographical Decameron' (1817); and 'Tour in France and Germany' (1821); Horne's 'Introduction to the Study of Bibliography' (1814); Robert Watt's 'Bibliotheca Britannica' (1824, 4 vols. 4to), a work of stupendous labor and great utility; Joseph W. Moss' 'Manual of Classical Bibliography' (1825); Darling's 'Cyclopædia Bibliographica' (chiefly theological literature, 1854); 'A Bibliographical and Critical Account of the Rarest Books in the English Language,' by J. Payne Collier (1865); Lowndes' 'Bibliographer's Manual,' edited by H. G. Bohn (1869, 6 vols.); S. A. Allibone's 'Critical Dictionary of English Literature and British and American Authors' (Philadelphia 1859-71, 3 vols., and 2 of Supplement 1891); Halkett and Laing's 'Dictionary of the Anonymous and Pseudonymous Literature of Great Britain' (1882-8, 4 vols.); Sampson Low's 'English Catalogue of Books,' which in a series of successive volumes catalogues the British books published from 1835 onward to the present time.

American literature has already given rise to quite an extensive series of bibliographical works on both sides of the Atlantic. Among these are: 'Bibliographical Catalogue of Books, etc., in the Indian Tongues of the United States' (1849); Duyckinck, 'Cyclopedia of American Literature' (1856); Ternaux-Compans, 'Bibliothèque Américaine' (Paris 1837); Trübner, 'Bibliographical Guide to American Literature' (Lon-

don 1856); and 'General American Catalogue' of Leypoldt and Jones (1880, with continuations); 'The Publisher's Trade List Annual'; 'Monthly Cumulative Index'; 'American Book Prices Current.'

The learned Germans, little assisted by public and almost entirely destitute of private collections, consulting only the real wants of the science, have actively endeavored to promote it. Ersch is the founder of German bibliography. He gave it a truly scientific character by his extensive work, 'Allgemeines Repertorium der Literatur' ('Universal Repertory of Literature' 1793-1807), and by his 'Handbuch der Deutschen Literatur' ('Manual of German Literature'). German bibliography is particularly rich in the literature of separate sciences; and the bibliography of the Greek and Latin literature, as well as the branch which treats of ancient editions, was founded by the Germans. The first attempt, in Germany, to prepare a universal bibliographical work was made by Ebert. The following are valuable German bibliographical works in particular departments of science and literature: T. A. Nosselt, 'Anweisung zur Kenntniss der Besten Allgemeinen Bücher in der Theologie' (4th ed. 1800), and the continuation of it by Simon (1813); C. F. Burdach, 'Literatur der Heilwissenschaft' (1810); W. Gf. Ploucquet, 'Literatura Medica' (1808, 4 vols.); T. G. Meusel, 'Bibliotheca Historica' (1782-1802); his 'Literatur der Statistik' (1816); G. R. Böhmer, 'Bibliotheca Scriptorum Historiæ Naturalis' (1785-99, 7 vols.); Alb. Haller, 'Bibliotheca Botanica' (Zurich 1771, 2 vols.); 'Anatomica' (Zurich 1774, 2 vols.); 'Chirurgica' (Bern 1774, 2 vols.); and 'Medicina Practica' (Bern, 1776, et seq., 4 vols.); R. Buckner, 'Bibliographisches Handbuch der Deutschen Dramatischen Literatur' (Berlin 1837); W. Engelmann, 'Bibliotheca Geographica' (2 vols. 1858), a classified catalogue of all works in geography and travels published in Germany from the middle of the 14th century down to 1856, with prices, index, etc.; W. Engelmann, 'Bibliotheca Philologica' (3d ed. 1853) contains a list of Greek and Latin grammars, from 1750 to 1852; the same writer has published bibliographical works on mechanical technology, medicine, economy, veterinary art, geography, zoology, palæontology, etc.; W. Heinsius, 'Allgemeines Bücherlexikon,' an extensive work forming (with its continuations) an alphabetical catalogue of all the books published in Germany from 1700 to 1888, with sizes, prices, and publishers' names; and Keyser's 'Vollständiges Bücherlexikon,' giving books published between 1750 and 1882.

Directions for the study of bibliography are contained in Achard's 'Cours Élémentaire de Bibliographie' (1807, 3 vols.); Th. Hartwell Horne's 'Introduction to the Study of Bibliography' (1814, 2 vols.); and Brunet's 'Connaissances Nécessaires à un Bibliophile' (Paris 1878).

Material Bibliography, often called by way of eminence bibliography, considers books in regard to their exterior, their history, etc., and has been principally cultivated in France and England. The different branches of material bibliography may here be mentioned: the knowledge of the ancient editions (*incunabula*, or, if classical authors, *editiones principes*), some of the best works on which are G. Wfg. Panzer's 'Annales Typographici' (1793-1803, 11 vols.),

coming down to 1536; the 'Annales Typographici,' by Maittaire (Hague 1719, et seq., 11 vols. 4to), which not only contains the titles, but investigates the subjects of works. More exact descriptions of particular ancient editions are found in Serna Santander's 'Dictionn. Bibliogr. du 15ième Siècle' (Brussels 1805, 3 vols.); Fossius' 'Catalogus Codicum,' sec. 15, 'Impressor. Bibliothecæ Magliabecchianæ (Florence 1793, 3 vols. fol.); and others. The study of rare books, on account of the vague principles on which it rests, is more difficult than is generally believed, and easily degenerates into superficial and capricious trifling. This has been more injured than promoted by I. Vogt's 'Catalogus Librorum Rariorum' (1793), and J. Jac. Bauer's 'Bibliotheca Libror. Rarior. Universalis' (1770-91, 12 vols.). We may also mention here the catalogues of the books prohibited by the Roman Catholic Church ('Indices Librorum Prohibitorum et Expurgatorum'). For the discovery of the authors of anonymous and pseudonymous works, we may use Barbier's 'Dictionnaire des Ouvrages Anonymes et Pseudonymes' (1806-9, 4 vols.), which is valuable for its accuracy (but contains only French and Latin works); Quérard's 'Dictionnaire des Ouvrages Polyonymes et Anonymes de la Littérature Française' (Paris 1854-6), and his 'Supercheries Littéraires Dévoilées' (5 vols. Paris 1845-56). We need not observe what an important source of information in the department of bibliography are literary journals. Poole's 'Index to Periodical Literature' contains references to an immense number of articles that have never been republished in books. See BIBLIOMANIA.

Bibliomancy, divination performed by means of the Bible, also called *sortes biblicæ*, or *sortes sanctorum*. It consisted in taking passages at hazard, and drawing indications thence concerning things future. It was much used at the consecration of bishops. It was a practice adopted from the heathens, who drew the same kind of prognostications from the works of Homer and Virgil. In 465 the Council of Vannes condemned all who practised this art to be cast out of the communion of the Church; as did the councils of Agde and Auxerre. But in the 12th century we find it employed as a mode of detecting heretics. In the Gallican Church it was long practised in the election of bishops; children being employed, on behalf of each candidate, to draw slips of paper with texts on them, and that which was thought most favorable decided the choice. A similar mode was pursued at the installation of abbots and the reception of canons; and this custom is said to have continued in the cathedrals of Ypres, St. Omer, and Boulogne, as late as the year 1744. In the Greek Church we read of the prevalence of this custom as early as the consecration of Athanasius, on whose behalf the presiding prelate, Caracalla, archbishop of Nicomedia, opened the Gospels at the words, "For the devil and his angels" (Matt. xxv. 41). The bishop of Nice first saw them, and adroitly turned over the leaf to another verse, which was instantly read aloud: "The birds of the air came and lodged in the branches thereof" (Matt. xiii. 32). But this passage appearing irrelevant to the ceremony, the first became gradually known, and the Church of Constantinople was violently agitated by the most fatal divisions during the patriarchate.

Biblioma'nia ("book-madness"), a word formed from the Greek, and signifying a passion for possessing rare or curious books. The true bibliomanist is determined in the purchase of books less by the value of their contents than by certain accidental circumstances attending them. To be valuable in his eyes they must belong to particular classes, be made of singular materials, or have something remarkable in their history. Some books acquire the character of belonging to particular classes from treating of a particular subject; others from something peculiar in their mechanical execution (as the omission of the word "not" in the seventh commandment, which gives the Wicked Bible its name), or from the circumstance of having issued from a press of uncommon eminence, or because they once belonged to the library of an eminent man. But there are certain fashions in bibliomania, and books much sought at one time may at another be comparatively neglected. Some collections of books may possess or have possessed much intrinsic value; such as collections of the various early editions of the Bible; collections of editions of single classics (for example, those of Horace and Cicero); the editions of the Greek and Latin classics *in usum Delphini* and *cum notis variorum*; the editions of the Italian classics printed by the Academy *dell a Crusca*; works printed by the Elzevirs and by Aldus; the classics published by Maittaire or Foulis; and the celebrated Bipont editions, with others. It perhaps was more customary in former times than at present to make collections of books which have something remarkable in their history (for example, books which have become very scarce, and such as have been prohibited), yet various scarce books are highly prized on account of nothing but their rarity, the original (1786) Kilmarnock edition of Burns' Poems, for instance. First editions may be ranked in the same class. Books distinguished for remarkable mutilations have also been eagerly sought for. Those which appeared in the infancy of typography called *incunabula*, from the Latin *cuna*, a cradle, and among them the first editions (*editiones principes*) of the ancient classics, are still in general request. An enormous price is frequently given also for splendid proof impressions of copperplate engravings, and for colored impressions, for works adorned with miniatures and illuminated initial letters; likewise for such as are printed upon vellum. Works printed upon paper of uncommon materials, or various substitutes for paper (asbestos, for instance), have been much sought after; likewise those printed upon colored paper. Other books in high esteem among bibliomanists are those which are printed on large paper, with very wide margins. In English advertisements of rare books some one is often mentioned as particularly valuable on account of its being "a tall copy." If the leaves happen to be uncut the value of the copy is much enhanced. Other works highly valued by bibliomanists are those which are printed with letters of gold or silver, or ink of singular color; for example: (1) 'Fasti Napoleonici' (Paris 1804, 4to), a copy on blue vellum paper, with golden letters; (2) 'Magna Charta' (London 1816, fol.), three copies upon purple-colored vellum, with golden letters.

Bibliomania often extends to the binding. In France the bindings of Derome, Padeloup, and

Bozerian are highly valued; in England those of Charles Lewis and Roger Payne, among 18th century binders; while Hayday, Rivière, Bedford, and Zaehnsdorf may be mentioned as among the notable craftsmen of the 19th. Even the edges of books are often adorned with fine paintings. Many devices have been adopted to give a factitious value to bindings. Jeffery, a London bookseller, had Fox's 'History of King James II.' bound in fox-skin, in allusion to the name of the author; and the famous English bibliomanist, Askew, even had a book bound in human skin. In the library of the castle of Königsberg are 20 books bound in silver (commonly called the silver library). These are richly adorned with large and beautifully engraved gold plates in the middle and on the corners. To the exterior decoration of books belongs the bordering of the pages with single or double lines, drawn with the pen (*exemplaire réglé*), commonly of red color—a custom which we find adopted in the early age of printing in the works printed by Stephens. The custom of coloring engravings has generally been dropped, except in cases where the subject particularly requires it (for instance, in works on natural history, or the costumes of different nations), because the colors conceal the delicacy of the engraving.

Other means of idle competition being almost all exhausted, a new method of gratifying the bibliomanist taste was adopted, that of enriching works by the addition of engravings,—illustrative indeed of the text of the book, but not particularly called for,—and of preparing only single copies. Books are often mutilated in this way to enrich some other book. Such "grangerized" copies have long been well known.

Among recent books valued as specimens of typography are some of those that issued from the Kelmiscott Press of the late William Morris. Bibliomania, which flourished first in Holland (the seat likewise of the tulipomania) toward the end of the 17th century, has prevailed in England to a much greater extent than in France, Italy, or Germany. The modern bibliomania is very different from the spirit which led to the purchase of books in the Middle Ages at prices which appear to us enormous. External decorations, it is true, were then held in high esteem; but the main reason of the great sums then paid for books was their scarcity, and the difficulty of procuring perfect copies before the invention of the art of printing. See Dibdin, 'Bibliomania' (1811); Fitzgerald, 'The Book Fancier' (1886); Lary, 'The Library' (1886); Burton, 'The Book Hunter' (1882); Field, 'The Love Affairs of a Bibliomaniac' (1896); Merryweather, 'Bibliomania of the Middle Ages' (1849, reprint, 1900).

Bibra, bē-bra, Ernst von, German scholar and writer: b. Schwebheim, Bavaria, 9 June 1806; d. Nuremberg, 5 June 1878. Being left an orphan with a large fortune at an early age, he devoted himself to physical science, and published various works that brought his name before the public. He traveled in South America, taking home with him important natural history and ethnological collections. Among his numerous works are: 'Travels in South America'; 'Memories of South America'; 'Sketches of Travel and Novels'; etc.

Bib'ulus, Lucius Calpur'nus, Roman politician; d. near Corcyra, Greece, 48 B.C. He was consul with Julius Cæsar in 59 B.C., which office he acquired through the influence of the aristocratic party. After his opposition to Cæsar's agrarian law had failed, he secluded himself in his house, whence he issued edicts against the measures of Cæsar. In 49 B.C. Pompey appointed him commander of the fleet in the Roman Sea. In the following year Cæsar eluded him and crossed over into Greece.

Bicanere, bīk-ā'nēr, India, a town, capital of a principality of the same name; 240 miles west by south from Delhi. With its battlemented walls and large citadel, both flanked with round towers, and its temples, one of which rises to a great height, it presents a magnificent appearance to the traveler approaching it through the desolate tract of country in which it stands; but a nearer inspection dispels the illusion, and the greater part of the houses are found to be hovels of mud, painted red. Water is obtained from wells.

Bicar'bonate. See CARBON.

Bicci, Ersilio, bē'chē, ār-sēl'yō, Italian poet: b. 1845. He studied in Florence, and became professor of Italian literature in the Licei Dante and Toscanelli of that city. His best composition is in the collection styled 'New Verses.'

Bice, bice, the name of two colors used in painting, one blue, the other green, and both native carbonates of copper, though inferior kinds are also prepared artificially.

Biceps (*biceps flexor cubiti*), the principal flexor muscle of the arm, the muscle popularly shown as evidence of muscular development. At its upper end it consists of two parts, one being attached to the coracoid process of the scapula, and the other to the margin of the glenoid fossa, about the joint. This latter, the long head, passes over the head of the humerus as a tendon and unites with the short head to form the belly of the muscle. The lower end of the biceps is inserted for the greater part to the radius, and a smaller tendinous expansion is inserted in the fascia of the forearm. The action of the biceps is to bring the forearm to the arm and to turn the inturned hand outward.

Bicêtre, bē-sātr, France, a village a little to the southwest of Paris, with a famous hospital for old men in indigent circumstances, and an asylum for lunatics, together forming one vast establishment. This establishment was originally founded by Louis IX. as a Carthusian monastery, became later a castle, which was demolished in 1632, after being long in a ruinous state, and was restored by Louis XIII., and destined as a retreat for infirm officers and soldiers. When Louis XIV. afterward erected the great Hôtel Royal des Invalides, Bicêtre became a general hospital, and it continued as such down to the Revolution, while it contained also a house of correction for swindlers, thieves, etc. The establishment was then entirely altered and converted to its present use, the buildings being partly pulled down and replaced by new ones. The poor persons admitted must be at least 70 years of age, or incapacitated by some incurable disease from earning a livelihood. The lunatics are such as belong to the department of the Seine. They are attended to with the greatest

BICHAT — BICKERSTETH

care, and fabricate neat little articles of wood and bone, known in France by the name of "Bicêtre work." The number of beds in the institution is over 2,700.

Bichat, Marie François Xavier, bē-shār, mā-re' frān-swā ksāv-ē-ā, French physician: b. Thoirette, department of Jura, 14 Nov. 1771; d. 22 July 1802. His father, a physician, early initiated him into the study of medicine, which the young Bichat prosecuted at Lyons and Paris, where he studied under the direction of Desault (q.v.), who treated him as a son. On the latter's death, Bichat superintended the publication of his surgical works, and in 1791 began to lecture upon anatomy in connection with experimental physiology and surgery. From this period, amidst the pressing calls of an extensive practice, he employed himself in preparing those works which spread his reputation through Europe and America, and which had the most beneficial influence upon medical science generally. In 1800 appeared his 'Treatise on the Membranes,' which passed through numerous editions, and immediately after publication was translated into almost all European languages, and 'Researches Concerning Life and Death,' followed, the next year, by his 'General Anatomy' (4 vols. 8vo)—a complete code of anatomy, physiology, and medicine, which was translated into English by Dr. G. Hayward, and published in 3 vols. 8vo. In 1800 he was appointed physician of the Hôtel-Dieu, in Paris, and with the energy characteristic of true genius began his labors in pathological anatomy. In a single winter he opened no less than 600 bodies. He had likewise conceived the plan of a great work upon pathology and therapeutics; and immediately upon commencing his duties as physician to the Hôtel-Dieu he began his researches in therapeutics by experiments upon the effects of simple medicines. In the midst of his activity and usefulness he was cut off by a malignant fever, probably the consequence of his numerous dissections. His friend and physician, Corvisart, wrote to Napoleon in these words: "Bichat has just fallen upon a field of battle which counts more than one victim; no one has done so much, or done it so well, in so short a time." He was the creator of general anatomy, or of the doctrine of the identity of the tissues of the different organs, which is the fundamental principle of modern medicine.

Bichir, bē-shēr', one of the African mud-fishes (*Polypterus bichir*), which inhabits the upper Nile and its tributaries, and is regarded as the best food-fish of those waters. It is only about a foot long, and is one of the few remaining species of the great extinct group *Ganoidea* (q.v.), and is related to the American gar-pike. See MUD-FISH; REED-FISH.

Bichloride (-klo-') of Gold, a substance formed by the action of chlorine gas upon dry metallic gold that has been previously thrown down in the form of an impalpable powder, by chemical means. Some authorities assert that the substance so formed is a true chemical compound, having the formula AuCl_2 ; while others maintain that it is a mere mixture of metallic gold and the well-known trichloride, AuCl_3 . The so-called "bichloride of gold" has risen into notoriety on account of the use made of it by the late Dr. Keeley of Dwight, Ill., in the cure of dipsomania and chronic alcoholism. Its gen-

eral characteristics, chemically and physiologically, are to a great extent similar to those of mercury bichloride. Its employment by Dr. Keeley produced a profound impression on the medical world, and many partisans both for and against its virtues exist. The success, from a financial standpoint, of the Dwight sanitarium, brought forth many imitators, and much harm has been done by unskilful persons using this dangerous and powerful medicinal agent.

Bickerstaffe, Isaac, Irish dramatic writer: b. Ireland, about 1735; d. about 1812. He wrote many successful pieces for the stage, some of which such as the operas of 'Love in a Village' and 'The Padlock,' are still represented. His celebrated comedy of 'The Hypocrite,' adapted from Colley Cibber's 'Nonjuror,' which was again borrowed in its leading incidents from Molière, long retained its place on the stage, with its well-known characters of Mawworm and Dr. Cantwell. The music of many of Bickerstaffe's pieces was composed by Charles Dibdin. Latterly he retired to the Continent, and died there.

Bick'rateth, Rev. Edward, English clergyman: b. Kirkby-Lonsdale, Westmoreland, 19 March 1786; d. 24 Feb. 1850. He was educated in the grammar school of his native town, and at the age of 14 found a place in the post-office, London, where he remained for six years, afterward spending five years as an articled clerk with a London attorney. He then commenced business as a solicitor in Norwich, in partnership with his brother-in-law, and soon was in receipt of a large and increasing income. A great change, however, came over his mind and he began to exert himself in promoting the diffusion of the truths of religion among his fellow-men. Among other works accomplished by him was the establishment of the Norwich Church Missionary Society. He also published in 1814 'A Help to the Study of the Scriptures,' which met with great success. He then resolved to abandon the legal profession for that of a minister of the Church of England. The Church Missionary Society wished to send him abroad on a special mission to Africa, and in this view the bishop of Norwich, dispensing with the usual course of a university education, admitted him to deacon's orders on 10 Dec. 1815, and a fortnight afterward he was admitted to full orders by the bishop of Gloucester. Mr. Bickersteth thereupon, with his wife, proceeded to Africa, from which, after accomplishing the objects of his mission, he returned in the following autumn. He now filled the office of secretary to the Church Missionary Society, and from this period to 1830, when he resigned it, was indefatigable in the performance of its multifarious duties. In the year last mentioned he became rector of Watton, in Hertfordshire, and spent there the remainder of his life. He had now become widely known as one of the most influential and popular clergymen of the evangelical section. Besides taking an active share in furthering the cause of the various religious societies, including the Evangelical Alliance, of which he was one of the founders, he likewise issued a series of publications which had an immense circulation, among others: 'The Christian Student'; 'A Treatise on the Lord's Supper'; 'A Treatise on Prayer'; 'The Signs of the Times'; 'The Promised Glory of the

Church of Christ'; 'The Restoration of the Jews'; 'A Practical Guide to the Prophecies,' besides sermons and tracts without number.

Bickmore, Albert Smith, American naturalist: b. St. George, Me., 1 March 1839. He graduated at Dartmouth College in 1860, and studied under Agassiz at the Lawrence Scientific School of Harvard. In 1865-9 he traveled in the Malay Archipelago and in eastern Asia; in 1870 became professor of natural history in Madison (now Colgate) University; and in 1885 professor in charge of the department of public instruction at the American Museum of Natural History, New York. His publications include: 'Travels in the East Indian Archipelago' (1869); 'The Ainos or Hairy Men of Jesso'; 'Sketch of a Journey from Canton to Hankow.'

Bicknell, Frank Martin, American author: b. Melrose, Mass., 24 Jan. 1854. He graduated at the English High School, Boston, in 1872; engaged in business till 1888; and afterward devoted himself to literature. He has contributed largely to 'St. Nicholas'; 'Harper's Young People'; 'Youth's Companion'; 'Outing'; New York *Evening Post*; etc. He wrote 'The City of Stories'; 'The Apprentice Boy'; etc.

Bicknell, Thomas William, American educator: b. Barrington, R. I., 6 Sept. 1834. He was graduated from Brown University in 1860. During his senior year in college he was elected to the Rhode Island legislature, and after graduation was principal of schools in Rehobart, Bristol, and Providence, R. I., and in Elgin, Ill. In 1869-75 he was commissioner of the public schools of Illinois, and during this incumbency he secured the establishment of the State Normal School. He founded, edited, and owned 'The Journal of Education'; 'The Primary Teacher'; 'The American Teacher'; 'Education'; and 'Good Times,' between 1874 and 1886. He has been president of a number of educational institutes and Sunday-school unions. He has written 'State Educational Reports'; 'John Myles and Religious Toleration'; 'Life of W. L. Noyes'; 'Brief History of Barrington'; 'Barrington in the Revolution'; and 'The Bicknells.'

Bicycle, a light steel vehicle consisting of two wheels arranged tandem, united by a frame with the rider's seat upon it; propelled by his feet acting on pedals connected with one of the axles, at present that of the rear wheel; and steered by a handle-bar guiding the direction of the front wheel. As at present constructed the wheels are of equal size; the driving mechanism is usually a chain with the links fitting over a sprocket-wheel, but about one in 25 are chainless, mainly with a shaft and bevel driver; the weight is 23 to 27½ pounds, complete; the frame is of hollow cold-drawn tubing, with brazed joints; the wheels are suspension, with crossed tangent spokes, wooden rims, pneumatic tires, and ball bearings. The name dates from about 1865, though first so spelled in a patent of 8 April 1869, and elsewhere called 'bysicle,' 'bicircle,' 'bicycular velocipede,' etc.; but prior to 1870 the form of the machine was usually called a velocipede, a French name dating from 1779.

The pedomotor itself goes back perhaps to Egyptian and probably at least to classic times, winged figures astride of a stick connecting two wheels being found in the frescoes at Pompeii.

In the 17th century it suddenly appears with surprising frequency; there is a picture of a bicycle in a stained-glass window at Stoke Pogis, England; in August 1665, John Evelyn writes in his diary of "a wheele to run races in"; in 1690 a Frenchman named De Sivrac invented a two-wheeled *céléfère* having a horse-shaped wooden body with a saddle, and steered by the rider's feet; in 1693 Ozanam described before the Royal Society a vehicle pedaled by a foot traveler. In 1761 the 'Universal Magazine' describes a similar one invented by an Englishman named Ovenden; in August 1769 the 'London Magazine' describes "a chaise to go without horses." On 27 July 1779, *Le Journal de Paris* describes a *vélocipède* invented by MM. Blanchard and Magurier, which is merely the *céléfère* with an upright bar to support the hands; this gained considerable vogue. From France and England the idea spread to Germany, which added to it the one idea needed to vivify it. In March 1784 one Ignaz Trexler, of Gratz, Austria, invented a pedomotor credited with the speed of a galloping horse—unquestionably meaning down hill. But the direct progenitor of the modern bicycle was one built in 1816 by Baron Karl von Drais, Freiherr von Sauerbronn (1784-1851), chief forester to the Grand Duke of Baden (to whose memory in 1891 the bicyclers erected a monument at Carlsruhe), often called "the father of the bicycle." It was designed to aid him in his daily journeys. The whole was of wood; the wheels of equal size, connected by a perch, astride which the rider sat in a saddle, and to the fore end of which was swiveled a fork into which the front wheel was axled; the rider propelled it on level ground or up hill by striking the ground with his feet, and coasted down hill. But the significant feature, the germ of the bicycle, was the pivoting of the front wheel and its steering by a handle-bar; for which there was a stuffed arm-rest on an elevated cross-piece. Drais patented this in Paris, 1816, and claimed that it would go up hill as fast as a man could walk, on a level, after a rain, at six or seven miles an hour, or courier's pace, the same when dry at eight or nine, and down hill at a horse's gallop. It excited much attention and was called the "draisine"; and in 1818 one Dennis Johnson patented in England an improved form called the "pedestrian curricule," with adjustable saddle and elbow-rest. This started a fashionable furore, and those who could not afford it laughed at it as the "dandy-horse," and "hobby-horse," while the serious-minded invented a swarm of names for it, such as "patent accelerator," "swift-walker" (a literal translation of "velocipede"), "manivelociter," "bivector," etc., and finally, in 1819, "bicipede" and "tricipede"; but by this time the name "velocipede" had become the recognized current term. It had then become common enough to be prohibited in London, and to make dodging the machines a common exercise on the suburban roads; and bred complaints of leg disease, and a consequent invention by one Birch for using the arms instead. In 1821 Louis Gompertz patented an improvement in which the handle-bar was connected with a segment rack gearing into a pinion on the front wheel, so that either arms or feet could be used for propulsion; but the craze had worn itself out, and

BICYCLE

it was nearly half a century before it revived with a better machine. Meantime, in June 1819, the currie had been introduced into the United States, and became a craze in Boston, New York, Philadelphia, etc.; and many riding-schools were opened. On 26 June 1819 William K. Clarkson was granted a patent for an "improved velocipede"; but the excitement soon subsided here also. The grotesque appearance of a person leaning forward on his elbows and kicking away at the ground beneath his clumsy vehicle proved too much for the national sense of humor, and riders were the objects of ridicule. A typical "hobby-horse" in the early 'twenties had the following specifications: Wheels, wood, 32 inches; wheel base, 4 feet 7 inches; backbone, wood, 5 feet 9 inches long; saddle, hard wood, 1 foot 6 inches long; handle-bar, wood, 9 inches, elevated 48 inches above ground; finish, black paint; weight, 90 pounds. The arm-rest was of wood.

With the death of the draisine the idea was not altogether forgotten; both in England and on the Continent scattering pedomotors were built every few years, and the capital improvement of putting cranks on the front axle, creating the true modern bicycle, was at length devised. It is asserted, though not proved, that one Kirkpatrick McMillan of Courthill, Scotland, having tried in 1835 a system of cranks, side-levers, connecting-rods, and pedals, for propelling a tricycle, applied them successfully to a wooden bicycle in 1840; and it is certain that in 1846 Gavin Dalzell of Lesmahagow, Scotland, who had heard of McMillan's machine, invented and rode a rear-driving velocipede propelled by pedals on hanging levers, which, by means of connecting-rods instead of chains, rotated cranks on the rear axle. This machine, whose wheels were of wood shod with iron, and its frame somewhat dipped like the present ladies' wheel, made 10 or 12 miles an hour; it was a rather striking forecast of the modern "safety," though not in the least a germ of anything, as its existence was not known till 1892. It had also some important differences: the rear wheel was the larger, as in the "Humber" and "Star" machines, and the action was to-and-fro and not rotary. In 1855 a German instrument-maker named Philipp Maritz Fischer made and extensively rode a velocipede. But none of these were ever made for any persons but the owners, nor incited further invention.

The real ancestor of our bicycle, the crank-driven velocipede that led straight to better things, arose in France: the honor of the invention is hotly disputed. According to one account it belongs to Ernest Michaux, the son of a Parisian carriage repairer (to whom a monument was erected in 1894); but if so, he did not make it public and it led to nothing, and it is generally accredited as theory, where it belongs as practical result, to Pierre Lallement, a Parisian blacksmith, said to have been in Michaux's employ. It sprang, in fact, not from Michaux's, if that existed, but from a multicycle invented in 1865 by one Marechal; a five-wheeler, each wheel having an independent axle with cranks, loose pedals, and a separate seat; the front was the guide-wheel, but it could be ridden by one or many. In September MM. Woirin and Leconde patented a tricycle, with two smaller rear wheels on the same axle, and a large front one with cranks and loose pedals, the whole connected with a wooden horse-shaped body like

De Sivrac's, on whose back the rider sat well over the front wheel; this was the progenitor of the modern tricycle. Lallement, against the judgment of his friends, who thought that keeping one's balance would be impracticable on two wheels tandem, applied the principle thus the same year, learned the art of balancing, and exhibited his machine and his skill at the Paris Exposition of that year; but thought too little of it to patent it. The next year (1866) he came to the United States to look for work, made a velocipede and rode it about New Haven, Conn., and was induced by one James Carroll to patent it with him, which was done 20 November. It had two wooden wheels, the front one slightly the larger, with iron tires; was a front-driver; and the saddle was on a steel spring midway between the wheels. But it was too crude and unpleasurable to attract much notice. In France, however, great improvements were shortly made on it, and in the winter of 1867 it became the sensation of Paris; riding schools sprang up all about, and straps to fasten the machines were part of the equipment of the great places of amusement. This continued till the Franco-German war temporarily destroyed the business, which had developed a large manufacturing interest. Meantime, in England, Edward Gilman in 1866 had patented a rear-driver with a single treadle, and the chain gear had been broached. In 1869 the improved velocipede and the reflex of the French enthusiasm brought it into sudden vogue in the United States, and American inventiveness was turned toward perfecting it: at the time the "boom" burst in 1870 the Patent Office was receiving half a dozen applications for new patents every week. Up to 1869 the two wheels were of about the same size, 30 to 40 inches; and the earlier machines had wooden hubs, spokes, and rims, with steel tires. But the wire-spoke suspension wheel, re-invented in France in 1864, soon came in, and by 1869 all-steel wheels with hollow tubing were built; the prices were from \$75 to \$300, and cycling was a mark of some social distinction. In the West it was the universal roading sport, the leading manufactories being located there; rinks were built everywhere, and the wonderful trick-riding possible with the heavy wheels then made,—on flights of stairs, by jumps, etc., which our modern light wheels would not endure,—drew large crowds. But this weight,—116 pounds was medium, and in 1871 a 75-pound racer was much borrowed from its lightness,—made the sport a heavy tax even on the athletic, and insupportable to any others; the rigid tire made the jolting on rough roads or paved streets a torture, so that a current nickname for the machine was "bone-shaker." The low build covered the rider with the dirt of roads and carriages, and to avoid this and gain speed the front wheel was gradually raised and the seat carried up with it, and in 1869-70 two western builders placed large numbers of high or "ordinary" wheels on the market. But the steel tire made the exertion still more severe; and hostile municipal legislation, controlled by the horse owners, drove the bicyclers off every desirable riding road. The sport (till the "safety" came in it was only such) collapsed, with the suddenness of a financial crash, within a single week; thousands of machines, worth \$100 to \$150 one day, could not be sold at any price the next, and were ultimately disposed of to boys or the poorest classes at

BICYCLE

nominal prices, or allowed to become old iron; manufactories crowded with orders had them countermanded in a mass; rinks no longer drew; and what little was left of the sport, among those who owned fine machines and clung to them, was killed by the sale at nominal prices of a stock of cheap wheels made of gas-pipe, malleable fittings, and wooden wheels with steel tires, which soon fell to pieces, but destroyed all prestige in the sport. It was nearly a decade before America took it up again in any general way, and then with a different wheel, the bicycle proper.

Meantime a great development had gone on in England, where the hard, smooth macadam roads, and beautiful by-paths for cyclers without disturbing horses, made all conditions more favorable. The bicycle under that name was patented 8 April 1869; it had steel rims and solid rubber tires, round or half round. For speed the front wheel was gradually enlarged and the rear reduced to a mere steerer, till the Ordinary was attained in 1871, with a 40- to 48-inch front wheel and 16-inch rear; it was made feasible and popular by the rubber tires, which reduced the friction and jar, and consequently the needed propelling power. The front wheel was gradually raised in proportion to the rider's height and skill, and in the early eighties attained 60 and even 64 inches. It still remains the perfection of grace and simplicity in bicycle construction: the motive power being applied direct, and the wheel, with cranks and pedals, forming a solid body. It is also the most exhilarating to ride, given strength and skill. The greatest improvements were made by James K. Starley, of Coventry, England, the second "father of the bicycle"; his wheels in 1873 had become nearly all that made the best Ordinary, with steel frame, cross tension spokes, and solid rubber tires. In 1874 he patented the tangent wheel.

The Ordinary, however, could not be the bicycle of the future. It was hard to mount, except in favorable spots, and if the rider was dismounted had often to be walked long distances on streets or hillsides; both from this and the great air resistance due to the rider's elevation, it was merely the sport of a few athletic men, mostly young; headers were frequent from the rider's mass centre being directly over that of the large wheel, and liable to be serious from his high seat, though the danger was exaggerated. A safer build was therefore mooted. The first idea was to bring the rider's centre below that of the driving wheel; this could only be accomplished by operating the pedal with some kind of leverage, and a rear-driving safety with lowered front wheel was patented in 1879 by H. T. Lawson of England. A similar type, called the "Bicyclette," followed in 1880. In the same year the "Star," a reversed Ordinary with the small wheel in front, was introduced and had something of a run; the "Humber Safety" in 1885 copied the type with more extreme difference in wheels, and the current joke upon it was an imaginary Irish description that "the big wheel is the smallest and the hind wheel is in front." But with the high wheel there is always liability to a tumble, and a "backfall" is worse than a "header"; and the "Dwarf Bicycle," as the

safeties were called, grew in favor. The "Extraordinary" and the "Facile" about 1882 had some trial; but a more popular form, which had high racing speed and made new records, was Starley's "Kangaroo" (1883), with diamond frame, independent crankshafts, and two chains gearing them to the front wheel. The gain of the geared wheel over the Ordinary is not only in lessened air resistance from the lower seat, but because length of crank and pedal speed can be gauged to the most favorable speed for the rider, while in the Ordinary the crank is too short and the pedal speed too rapid for the best results. But the alternate tightening and loosening of the chain twice in every revolution, and other defects, caused its early displacement by Starley's famous and still speedier "Rover" (1884), for a long time the popular term for "safeties" of any pattern. Here the cranks and pedals were on a separate axle, connected with the driving-wheel by a single chain which was therefore permanently tight; the seat was far back over the rear wheel, so that headers over the handle-bar were absolutely impossible. The front wheel was about one fourth larger than the rear; later they were made of practically the same size as now, completing the evolution back to the velocipede, and making its general utility possible. With the low seat any one can mount, and the exercise is not too severe; and it makes possible the drop-frame for ladies. The Ordinary, as its name implies, maintained the field for a while; the sporting idea was still in the ascendant, the "safety" was sneered at as the effeminate and rather cowardly refuge of weaklings and old men, and it was not believed that it could compete in racing speed. But about 1886 the public began to realize its immense business and social advantages, and with numbers the fear of ridicule vanished; by 1888 five sixths of the sales were of "safeties," and by 1890 the Ordinary had become a curio or the equipment of trick riders. For many years now both names have gone out of use, all being "safeties," and the compendious "bicycle" or simply "wheel" (a reminiscence of the Ordinary, where the driving-wheel was everything) covers all. This advent of the "safety" has carried the bicycle into everyday business and the life of every household; carriers, policemen, messengers, etc., find it of great service; competition has lowered prices to the level of the very servant-girls and street boys; and there is hardly a spot in the modern world into which it has not penetrated. There are great manufactories engaged in bicycle manufacture, and also in making the machines used in their construction. In the United States alone, in 1900, nearly 20,000 people were earning their living by their direct manufacture, besides more than 6,000 establishments and nearly 10,000 persons employed in repairing and many more in selling them. Even in war they have shown their utility. They have been adopted for military purposes by many of the nations of the world: by Austria-Hungary in 1884; by England and Switzerland in 1887; by Belgium in 1889. The French army is said to be equipped with several thousand bicycles, and a perfected system of drill and tactics for advance-

BICYCLE

guard duty, skirmishing, and rapid movements has been introduced into the various armies. A detachment of bicycle-mounted soldiers has been found useful in accompanying the motor Maxim gun, first tried in 1899. The military bicycle is especially constructed for hard work and rough usage. Some of the French machines are made to fold, so that when the riders come to impassable ground they can double them up and carry them on their backs.

Partly effect but mainly cause of this general use has been the direction of inventive genius to the advancement of speed or comfort, often both at once. Every feature,—material, frame, spokes, gearing, tire, bearings, rim, handle-bar, brake, and others,—has been vigilantly and tirelessly studied to win public favor, and there is hardly a more wonderful machine existent. The enormous brain-power devoted to its perfection is shown by the fact that in the United States alone 7,573 patents had been granted up to 1900 for cycles and their parts, and probably double that in the world altogether. Of these, in our own country only 16 had been issued before 1865, and the great majority were granted after 1890. In 1892 the applications had grown so numerous that a special department of the Patent Office was created for them.

The greatest of all single ones, and the one which has revolutionized the business and made cycling a luxury rather than an exertion, is the pneumatic tire, which not only saves jolts by rolling into instead of on and off the minute obstructions of the roadway, but for the same reason increases speed, each rise of the wheel taking so much more muscular exertion. It must be confessed, however, that a heavy price is paid in the endless nuisance of punctures, ending many rides abruptly, and involving a walk for miles—something unknown with the solid tire. It was originally invented, not for bicycles, but road wagons, by an English civil engineer named R. W. Thompson, in 1843, and patented in the United States in 1847; but fell flat and was allowed to lapse. The first bicycle tires were iron or steel; then a strip of rubber was fastened over the tire; later, a round or half-round piece of solid rubber was cemented or fastened into the hollow of the rim. But in 1880 an Irish veterinary surgeon, Dr. John B. Dunlop, fitted a piece of rubber hose to his son's bicycle; it worked so well that he patented it, not broadly, but for specific details now disused. Shortly after, I. W. Boothroyd of London described, but did not patent, a tire of this sort; and about the same time P. W. Tillinghast, of Providence, R. I., patented one in this country. Received with utter incredulity at first, and a not unjustifiable dread of punctures, in two years 40 per cent of all bicycles were fitted with it, and in two more no other was on the market. (The cushion tire, a large tire, solid except for a small air space running through it, was tried for a time in 1891 and after but was not a success). But even this would have been ineffectual save for the enormous reduction in weight by the use of steel weldless tubing and wire, so that a machine of the incredibly small weight of nine pounds has been used for racing, with a wheel on whose spokes

four men can stand without injuring them: these machines are too frail for road use, but even the average roadster does not reach 28 pounds, while in 1873 65 pounds, and even in 1885, 48 was thought fair, and 27 a racing wonder.

The ball-bearing, invented by an Englishman named Bonn, is another epoch-making invention, which revolutionized all previous theories. The earliest bicycle bearing was a plain one with a sleeve, known as the parallel bearing. The friction was so heavy that the roller bearing was substituted, but did not work well; the next was the adjustable cone, which for a time was the universal one. But in all solid-surface bearings the grinding of the sand which worked in made them irregular and rattling after a while, and the layers of gudgeon grease required a steady tax on time for cleaning. In the ball-bearing, the conical axle bears against a row of steel balls in a circle, tangent to the bearing surface and to two other surfaces at right angles, so that the friction is only against three points, and the bearing parts roll over instead of sliding upon each other. The wear of the balls is astonishingly slight, and from the constant change of surface there is little irregularity, and from the small contact points scarcely any making of axle grease.

A fundamental invention is the suspension wheel, by which, in the words of an English patentee of 1826, "the weight they have to carry is suspended from that part of the wheel which happens to be uppermost, instead of being supported, as is usual, by the spokes that happen to be under the axle-tree"—a principle invented by Leonardo da Vinci before 1490, re-invented as above stated, and in France in 1864. Spring seats have abolished the saddle-galling which was one of the worst tortures of the "bone-shaker," and even of the earlier bicycles. The wooden rim takes two and a half pounds off the weight of a machine, but is not used in England, the roads being too wet. The drop-frame for ladies' use is perhaps the most important single advance made on the velocipede, so far as the increase of social pleasure is concerned: in the same line are the construction of coupled machines for two, taking away the reproach often made that bicycling is "an essentially selfish pleasure." The coaster-brake is another important advance. The chain gearing which made the "safety" possible has been noted; later, much ingenuity has been employed to get rid of it, but not with perfect satisfaction, the cost being prohibitive to the mass, and the complaint of extra exertion being heard. The two chief devices for chainless machines are the pin-wheel gearing, which works smoothly but lacks durability; and the bevel gear, which is very difficult to cut so that the teeth shall fit exactly, but is said to increase in both accuracy and ease of driving with use, as the surfaces of the teeth grow to fit each other. In the chain gear the case is the reverse, as the links and rivets wear and dust grinds them off.

In the United States the bicycle did not appear after the collapse of 1870 till the Centennial Exposition of 1876, when some English machines were imported and exhibited. Col. Albert A. Pope of Boston saw them and thought of reviving the business here; went to England to study the industry, brought back some English wheels, and had W. S. Atwell of Boston build him one, weighing 70 pounds, and costing \$313. Again

visiting England, he decided that conditions here warranted their manufacture for the market, and in 1878 had the Weed Sewing Machine Company, of Hartford, Conn., make some "Columbias" for him in a corner of their shop, the first bicycles made in America. From the first, these have been the American model of durability and excellence of make, as well as of advanced invention in construction and fittings, and unsurpassed in the world; and they still maintain that position. The business soon grew into one of the great manufactories of the country, and was the chief of the companies merged in the American Bicycle Company a few years ago. The "safety" brought the same expansion here as elsewhere; but its very commonness and cheapness, with other causes, has, since about 1895, produced a severe decline. The chief falling off is in women's use: they have tired of it, as they do of every muscular sport except when novelty gives a brief stimulus or social opportunity; and the lamp laws in many localities nearly killed evening parties, the chief use they could make of it. The slackening of this demand produced a severe crisis in the business. Also, inventions have nearly reached their limit, to tempt youth with money to buy the latest new pattern; and the business has settled upon a firm though more limited basis of practical service and every-day pleasure. The census returns show the remarkable changes that have taken place in this trade during the past fifteen or twenty years. In 1890 there were 27 establishments engaged in making bicycles in the United States; the capital invested being \$2,058,072; the number of employees, 1,797, and the value of the product, \$2,568,326. By 1900, the business had so extended that the number of establishments had increased to 312; the amount of capital invested to \$29,783,659, while the 17,525 workmen employed received an annual wage of \$8,189,817. The cost of material in that year was \$16,792,051 and the value of the product \$31,915,908. Five years later, when the special census of American manufacturing interests was taken, the number of establishments had been reduced to 101. In that year the capital employed was but \$5,883,458; the number of employees, 3,319; the wages paid, \$1,971,403; the cost of materials, \$2,628,146, and the value of the product, \$5,153,240.

See H. A. Garratt, 'The Modern Safety Bicycle' (New York 1899); Andrew Sharp, 'Bicycles and Tricycles' (London 1896); and the valuable historical summary in the United States census reports of 1900, 'Manufactures' (Part IV., p. 329).

Bida, Alexandre, bē'dā, al-ek-sōndr, French painter: b. 1813; d. 2 Jan. 1895. He traveled in the East for two years, and most of his paintings have Oriental or Scriptural subjects. His best-known work is his illustrations for the 'Four Evangelists' (1876), and the 'Book of Ruth'; among his paintings are 'The Slave Market,' 'The Massacre of the Mamelukes,' 'Jews Praying at the Well of Solomon,' and 'The Field of Boaz.'

Bidar, bē'dār, India, an ancient town in the Nizam's dominions, 75 miles northwest of Haidarābād; noted for the metal ware to which it has given the name of Bidri or Bidery. It occupies a commanding site above the surrounding country, and its mosque and madriṣṣa or

college testify to its former splendor and importance. Pop. 14,000.

Bidassoa, bē-das-sō'a (Basque, "way to the west," or "two streams"), a river in Spain, about 45 miles long, the last 12 of which form the boundary between France and Spain. It rises in the mountains of Spanish Navarre, and, after various changes of direction, falls into the Bay of Biscay near Fontarabia. In former times Spain claimed not only the entire river, but so much of its banks, on the French side, as its waters covered at full tide. This difference was finally settled by each country contenting itself with its own shore. Near Irun there is a small island in the middle of the stream, called the Island of Pheasants, on which, being neutral ground, Louis XI. and Henry IV. met in 1463. Here also a peace was concluded between France and Spain in 1654.

Biddeford, Maine, city in York County, on the right bank of the Saco River, 6 miles from the sea, and on the Boston & Maine R.R., 15 miles southwest of Portland. The river separates it from Saco (q.v.), and, like that city Biddeford grew up as a manufacturing centre, its development being favored by the abundant water-power furnished by the falls, the stream descending here about 40 feet. The city also has a large local trade.

Industries.—The leading industries include the extensive manufacture of cotton goods, lumber, boots and shoes, machinery, etc. Here are some of the most important cotton mills in New England, the products of which are found in the markets of many states. Near the city are granite quarries which annually produce large quantities of superior stone, used in many parts of the world. Several thousand people are employed in the city's industries, and the flourishing of these has led to its gradual growth. It has two national banks.

Schools and Churches.—The public school system is well organized and conducted, and the various religious denominations are represented by 14 churches. The intellectual life of the people is also stimulated through useful local publications and an excellent public library.

History and Government.—The city was named from Biddeford, England, the home of some of its early settlers. In 1616 a small settlement was made at Biddeford Pool, near the mouth of the Saco, and Biddeford was settled under a patent in 1630, embraced Saco until 1718, and was then incorporated under its present name. This was long the chief settlement of the Maine province. In 1855 Biddeford received a city charter. The present government includes a mayor and a city council, elected annually. The population in 1900 was 16,145. In 1910 it had increased to 17,079. Consult: Folsom, 'History of Saco and Biddeford' (1830); Clayton, 'History of York County' (1880); Ridlon, 'Saco Valley Settlements and Families' (1895).

Biddle, Anthony Joseph Drexel, American publisher, journalist, and miscellaneous writer: b. Philadelphia, 1 Oct. 1874. He has written 'A Dual Role, and Other Stories,' 'An Allegory and Three Essays,' 'The Madeira Islands,' 'The Froggy Fairy Book,' 'All Around Athletics' (1894); 'The Flowers of Life' (1898); 'Shantytown Sketches' (1898).

BIDDLE

Biddle, Arthur, American lawyer: b. in Philadelphia, Pa., 23 Sept. 1852; d. 8 March 1897. He studied law and was admitted to the bar in 1878. Later he became a member of his father's firm and devoted much time to the study of certain branches, the results of which were published in his works, 'Treatise on the Law of Stock Brokers' (1881); 'Treatise on the Law of Warranties in the Sale of Chattels' (1884); and 'The Law of Insurance' (1893).

Biddle, Clement, American Revolutionary soldier: b. Philadelphia, 10 May 1740; d. there, 14 July 1814. He was educated in the tenets of the Society of Friends (Quakers), and in early life engaged in commercial pursuits in his native city; but notwithstanding his Quaker training, he joined a number of Quaker friends, in 1764, in forming a military corps for the protection of a party of friendly Indians who had sought refuge in Philadelphia from the fury of a band of lawless zealots known as the "Paxton Boys," who had recently massacred some unoffending Conestoga Indians at the interior town of Lancaster. These banditti, powerful in numbers, had advanced within five or six miles of the city, threatening destruction to all who should oppose them, when the vigor of the military preparations checked their further progress. Scarcely had this local disturbance been quieted when news was received of the resolution of the British House of Commons to charge certain stamp duties in the colonies. The feeling engendered throughout the whole country by this step and by the subsequent passage of the Stamp Act, induced, in Philadelphia, the celebrated "non-importation resolutions" of 25 Oct. 1765, signed by the principal merchants of the city, including Col. Biddle and his brother Owen. When all hope of a reasonable adjustment of the differences was lost, Col. Biddle was greatly instrumental in forming the "Quaker" company of volunteers raised in Philadelphia in 1775, of which he was elected an officer before the corps joined the army. Congress, on 8 July following, elected Col. Biddle deputy quartermaster-general of the militia of Pennsylvania, New Jersey, Maryland, and Delaware, ordered to rendezvous at Trenton. Col. Biddle took part in the battle of Trenton at the close of the same year, and, with another officer, was ordered by Washington to receive the swords of the Hessian officers. He was also engaged in the victory of Princeton, the surprise and retreat at Brandywine, and the unsuccessful enterprise of Germantown, and during the winter of 1777-8, shared the sufferings of the American army at Valley Forge. As commissary-general of forage under Gen. Greene he rendered important service to the army in several critical junctures, especially during the famine at Valley Forge. At Monmouth he shared the success of his countrymen. In September 1780, owing to the pressure of his private affairs, he was compelled to return to private life. His military career, however, was briefly renewed in the capacity of quartermaster-general of Pennsylvania in the expedition under Washington, in 1794, against the whiskey insurgents of that State. Col. Biddle labored earnestly also in the early political movements of the patriot party of his State, advocating effectively the revolutionary State constitution of 1776 (which his brother Owen had had, as a member of the convention, a share in framing).

He was also active in support of a declaration or bill of rights as a constituent part of the Federal Constitution to prevent abuse or misconstruction of its powers. After the organization of the Federal government under the Constitution of 1787, Col. Biddle was appointed marshal of Pennsylvania, as an evidence of the regard in which he was held by Washington.

Biddle, James, American naval officer: b. 28 Feb. 1783; d. 1 Oct. 1848. He was educated at the University of Pennsylvania, and entered the navy in 1800. In the war against Tripoli he served as a midshipman, was taken prisoner and kept in confinement for 19 months. In the War of 1812, he was a lieutenant on the Wasp when she captured the Frolic and was later captured by the Poictiers. Though a prisoner for a short time, Biddle was exchanged, and in 1813 took command of the Hornet and captured the British brig Penguin on 23 March 1815, being wounded in action. He was made captain in 1815, and received a gold medal from Congress in reward for his services. He was afterward commissioner to Turkey and China, and in 1845 negotiated the first treaty between the United States and China. He also served in the Mexican war.

Biddle, John, English Socinian writer: b. Wotton-under-Edge, Gloucestershire, 14 Jan. 1615; d. London, 22 Sept. 1662. He entered Magdalen College, Oxford, in his 19th year, and graduated A.M. in 1641. Being led to doubt the doctrine of the Trinity, he drew up 'Twelve Arguments' on the subject, for which he was committed to jail, but was released on bail. About six months afterward, on examination before a committee of Parliament, he acknowledged his opinion against the divinity of the Holy Ghost, and his 'Twelve Arguments' were ordered to be burned. He persisted in his opinion, and in 1648 published two tracts, containing his 'Confession of Faith Concerning the Holy Trinity,' and 'Testimonies' of Irenæus, Justin Martyr, and several other early writers on the same subject. On this the Assembly of Divines asked Parliament to decree the punishment of death against those who should impugn the established opinions respecting the Trinity, and to enact severe penalties for minor deviations. Such a decree was passed, but differences of opinion in the Parliament itself, and the penalties to which this sweeping measure rendered many in the army liable, prevented its execution. Biddle was again remanded to prison, however, and remained for some years in rigorous confinement. A general act of oblivion in 1651 restored him to liberty, when he immediately disseminated his opinions both by preaching and by the publication of his 'Twofold Scripture Catechism.' For this he was confined in the Gate House for six months. Cromwell banished him to St. Mary's Castle, Scilly Is., assigning him an annual subsistence of 100 crowns. Here he remained three years, until liberated in 1658. He then became pastor of an Independent congregation, and continued to support his opinions until fear of the Presbyterian Parliament of Richard Cromwell induced him to retire into the country. On the dissolution of that parliament he preached as before until the Restoration, after which he was obliged to confine himself to private preaching. In June 1662 he was apprehended at one of the private assemblies, and

upon process of law fined \$100, and ordered to lie in prison until it was paid. He fell a victim to jail fever and died in the 47th year of his age, a martyr to religious intolerance. His private character was moral, benevolent, and exemplary, and Toulmin styles him the "father of the modern Unitarians."

Biddle, Nicholas, American naval officer: b. Philadelphia, 10 Sept. 1750; d. 7 March 1778. In 1765, while on a voyage to the West Indies, he, with two others, chosen by lot, were left for two months on an uninhabited island. In 1770 he entered the British navy. When Phipps, afterward Lord Mulgrave, was about to start on his exploring expedition, young Biddle, though a midshipman, deserted his own vessel and shipped as a seaman on the *Carcass*, serving through the cruise with Lord Nelson, who was a mate of Phipp's vessel. On the commencement of the American Revolution he came to America and was made captain of the *Andrew Doria*, a brig of 14 guns and 130 men, taking part in Commodore Hopkins' attack on New Providence. After refitting in New London he was ordered on a cruise to the banks of Newfoundland, and in 1776 took, among other prizes, two transport ships with valuable cargoes and a battalion of Highland troops. He was appointed to the command of the *Randolph*, a 32-gun frigate, in February 1777. In March 1778 he was wounded in an action with the *Yarmouth*, an English 64-gun ship. While under the hands of a surgeon the magazine blew up, and the whole crew of the *Randolph* were lost, except four men, who were tossed about on a piece of wreck for four days before being rescued. The other vessels of the squadron escaped in consequence of the disabled state of the *Yarmouth*.

Biddle, Nicholas, American financier: b. Philadelphia, Pa., 8 Jan. 1786; d. same city, 27 Feb. 1844. He became secretary to John Armstrong, United States minister to France, in 1804, and subsequently went as secretary to James Monroe, then United States minister to England. He returned home in 1807, was elected to the Pennsylvania legislature in 1810, and was appointed a director of the United States Bank in 1819. He became president of the bank in 1823 and managed it ably down to the expiration of its charter. The financial trouble precipitated upon the country by Jackson's withdrawal of the government deposits in 1833 gave an unfortunate ending to Biddle's career as a banker, but while both his ability and his integrity were questioned at the time, he has been amply vindicated since. Besides miscellaneous writings, he published a 'Commercial Digest,' and 'History of the Expedition Under Lewis and Clarke to the Pacific Ocean.' He was president of the board of trustees for the funds of Girard College, and was instrumental in establishing that institution.

Biddle, Richard, American lawyer: b. Philadelphia, Pa., 25 March 1796; d. Pittsburg, 7 July 1847. He studied law and was admitted to the bar in Pittsburg. He was a member of Congress (1837-41), and was author of a 'Memoir of Sebastian Cabot, with a Review of the History of Maritime Discovery' (1831).

Bid'dulph, Sir Michael Anthony Shrapnel, English military officer: b. Cleeve Court, Somersetshire, 1823. He entered the Royal artillery

in 1844; became captain in 1850; major, 1854; colonel, 1874; major-general, 1877; lieutenant-general, 1881; and general in 1886. He served in the Crimean war at Alma, Inkerman, Balaklava, and the siege of Sebastopol. In India he commanded the field force and marched to Kandahar and the Helmund, and returned by the Tal Chotali and Boree to the Indus, in 1878-9. He was retired in 1890, and in 1896 became gentleman usher of the Black Rod. He published 'Illustrated Forrester's Norway' (1849).

Bideford, England, a market town and municipal borough of Devonshire; 44 miles north of Plymouth; situated on both sides of the Torridge, four miles from the sea, the principal portion being on the west side, on a bold acclivity. A handsome stone bridge of 24 arches, and 677 feet in length, connects the two divisions of the town. It has a spacious marketplace; an Elizabethan town-hall, public assembly rooms, and music hall. The Bridge Hall in French Renaissance style, contains a free library, a reading-room, and a science and art school. The most important church is that of St. Mary, in Perpendicular style, rebuilt, except the tower, in 1865. The chief industries comprise the manufacture of coarse earthenware, and collars and cuffs, tanning, malting, iron-founding, etc. In former times Bideford had an extensive shipping trade, and is said to have imported more tobacco in some years than the metropolis. Pop. about 10,000.

Bidie, George, English medical officer: b. Blackies, Banffshire, 3 April 1830. He was educated at the University of Aberdeen, and appointed deputy surgeon-general, in charge of the British Burma division in 1884; sanitary commissioner of the Madras presidency in 1885-6. He discovered, in 1867, a preventive for an insect pest which threatened to destroy the coffee growth in southern India. In 1898 he became honorary surgeon to the queen. His publications include 'Reports on the Ravages of the Borer Insect on Coffee Estates' (1869); 'Handbook of Practical Pharmacy' (1883); 'Catalogue of Gold Coins in the Government Central Museum, Madras' (1874); 'Neilgherry Parasitical Plants Destructive to Forest-trees' (1874); 'Catalogue of Raw Products of South India sent to Paris Exhibition' (1878); 'Native Dyes of Madras' (1879); 'Pagoda or Varaha Coins of South India' (1883); 'Sand-binding Plants of South India' (1883); etc.

Bidpai, bid'pī, or Pilpai. When we consider the wonderful history of 'Bidpai's Fables,' their fame, and their charm, we naturally invest their suppositious author with a personality and a name, in fact, however, "Bidpai" is probably a changed form of an Indian word for "court-scholar," misunderstood as a proper name, and implying therefore neither personality nor specific date. In India, from early times the parable or "example" has been the recognized method of conveying moral instruction. In the didactic literature, some general truth or some rule of life is stated in the form of a maxim, and a beast fable or other story then added as a concrete instance or "example." The folk-lore of which these tales are a reflex is not the exclusive property of any of the great religions of ancient India, but is common to Buddhism, Jainism, and Brahmanism alike. The sculptured representations of the stories upon the great

Buddhist monuments of 250 B.C. make it certain that the stories themselves were familiar to the common people at that early date; and it is hardly less certain that they were so known long before that time. The oldest and most important collection of Indian folk-lore is the Buddhist one called 'Jataka'—that is, 'Birth-stories,' or stories of Gotama Buddha in his previous births: it consists of 550 tales, each containing a moral; each is placed in the mouth of the Buddha, and in each the Buddha plays the best and most important part. It is this device of a framework or setting for the folk-tales that constitutes the principal essentially literary element of the collection. Next in importance to the Buddhist 'Jataka' stands the Brahmanical 'Panchatantra.' Here the material is not essentially different in kind from that of the 'Jataka'; but again it is the setting of the material which gives the work its distinctive literary character. It is a kind of 'Mirror for Magistrates.' Both the 'Jataka,' written in Pali, and the 'Panchatantra,' in Sanskrit, are still extant, and contain many of the stories which in translations of translations attained great currency and celebrity in mediæval literature.

The precise Indian original of these translations is lost; but we know that it was translated into the literary language of Persia (the Pehlevi, or Pahleir), by command of the Sassanian king, Khosru the Just, about 550 A.D. From the Pehlevi came two notable versions: one the Old Syriac, called 'Kalilag and Damnag,' after the two jackals, Karataka and Damanaka, who figured prominently in the framework of the Sanskrit original; and the other is the Arabic version, called 'Kalilah and Dimnah,' or 'Fables of Bidpai,' made about 750 A.D. by Abd-allah ibn al-Moqaffa, a Persian convert to Islam under the Caliph al-Mansur. According to the Arabic introduction, Dabshelim was the first king of the Indian Restoration, after the fall of the governor appointed by Alexander at the close of his campaign in the Panjab, 326 B.C. When firmly established, Dabshelim gave himself over to every wickedness. To reclaim the king, a Brahman philosopher takes up his parable, as did Nathan before David, and at last wins him back to virtue. The wise man is called in Arabic *bid-bah*, and in Syriac *bid-vag*. These words are traced through the Pehlevi to the Sanskrit *vidya-pati*, 'master of sciences.' Accordingly *bidbah*, which has become Bidpai or Pilpai in our modern books, is not really a proper name, but an appellative, applied to a 'chief pandit' or 'court-scholar' of an Indian prince.

From the Arabic are descended, in the fourth generation from the original, a dozen or more versions, of which three may be mentioned as noteworthy links in the chain of tradition: the Greek one, made about 1080 by Symeon Seth, a Jewish physician; the Persian, made some 50 years later, by Nasr Allah of Ghazni; and the Hebrew, ascribed to Rabbi Joel, and probably made before 1250. Of the descendants in the fifth degree from the original, the 'Directorium Humanae Vitæ,' made about 1270 by John of Capua from the Hebrew, is distinctly the most celebrated, because it gave rise in turn to Danish, Dutch, Spanish, Italian, and French, and above all to the famous German and English versions mentioned below. But besides the 'Directorium,' we must notice the 'Specimen of the Wis-

dom of the Ancient Hindus,' a version into Latin from the Greek of Symeon, made by the Jesuit father, Petrus Possinus (1666); and the 'Anvar-i Suhaili' or 'Lights of Canopus,' a simplified recast of Nasr Allah's. In the second edition of his fables, La Fontaine tells us that he owes the largest part of his new material to 'Pilpay, the Indian sage.' Pierre Poussin's 'Specimen' was the one embodiment of his shadowy Oriental fabulist, and a French version of the 'Lights' was the other. Two offshoots of the 'Directorium' are of unrivaled interest to the student of the beast fable. The one is the 'Book of Examples of the Ancient Sages'; and the other is Doni's 'La Morale Philosophia' (1552). The 'Book of Examples' was made at the instance of Duke Eberhard in Bart, whose name and motto, 'Eberhart Graf s(u) Wirtenberg Attempto,' appear as an acrostic in the initials of the first sections. It was first printed about 1481, and has since been admirably edited by W. L. Holland (Stuttgart 1860). Holland used, besides three manuscripts, two printed editions without place and year, and enumerates 17 dated editions that appeared between 1483 and 1592. Four dated editions appeared at Ulm between 1483 and 1485. The great number of editions of the work, and their rapid succession, are the best proof of its importance as a means of instruction and amusement at the beginning of the age of printing. The examples themselves had doubtless pointed the moral of many an ancient homily long before the days of Gutenberg; but the language of the old German version of them is so remarkable for its simplicity, dignity, strength, and beauty, that we cannot wonder at its immense popularity; and to this version, more than to any other, is Europe indebted for the wide-spread knowledge of this cycle of literature from the last part of the 15th to the middle of the 17th century. The other offshoot of the 'Directorium'—namely, 'The morall philosophie of Doni: drawne out of the auncient writers. A worke first compiled in the Indian tongue, and afterwarde reduced into divers other languages: and now lastly Englished out of Italian by Thomas North' (London 1570)—is most interesting to us as English-speaking people because it is "the first literary link between India and England, written in racy Elizabethan," a piece of "Tudor prose at its best," a veritable English classic. Consult Keith-Falconer, 'Kalilah and Dimnah' (1885); Lanman, 'Sanskrit Reader' (1888); Rhys Davids, 'Buddhist Birth Stories' (1880); North, 'Morall Philosophie of Doni' (ed. Jacob 1888).

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Bidwell, John, American politician: b. Chautauque County, N. Y., 5 Aug. 1819; d. 5 April 1900. He went to California in 1841; served in the Mexican war, reaching the rank of major; was a member of the Constitutional Convention of 1849; and of the National Democratic Convention in Charleston, in 1860. In the Civil War he was brigadier-general of California militia. In 1864 he was elected to Congress as a Republican; in 1866 was a member of the Philadelphia Convention; in 1890 was the unsuccessful Prohibition candidate for governor of California; and, in 1892, unsuccessful candidate of his party for the Presidency.

BIEDA — BIELGOROD

Bieda, bē'da, the modern name of the ancient Blera, a town in Italy. It is noted for its extensive Etruscan necropolis of rock-hewn tombs, built in several terraces. These tombs are interesting from their imitation of dwellings. They have molded doorways, and within the ridge beams and rafters of the roof are cut in relief. There are rock benches on three sides, made to receive the dead, and besides the doors, numerous windows.

Biedermann, Friedrich Karl, German author: b. Leipsic, 25 Sept. 1812; d. 1901. He became professor of philosophy in Leipsic University in 1838 and held this chair till 1845, when he was deposed on account of his political opinions. In 1849 he played an important role in the parliament of Frankfort, and was reinstated as professor at Leipsic, but was again removed in 1853 for political reasons. He was editor of the *Deutsche Allegemeine Zeitung* (1863-6); and founded and edited a number of other liberal papers. His works include 'Wissenschaft und Universität' (1838); 'Die Deutsche Philosophie von Kant bis auf unsere Tage' (1842-3); 'Vorlesungen über Socialismus und sociale Fragen' (1847); 'Erinnerungen aus der Paul's Kirche' (1849); 'Fünfzig Jahre in Dienste des nationalen Gedankens' (1892).

Biefve, Eduard de, byēf ā-doo-ār dē, Belgian painter: b. Brussels, 4 Dec. 1809; d. there, 7 Feb. 1882. He painted many portraits, and was also noted for his scenes from history. His best known work probably is his 'Compromise of the Netherland Nobles at Brussels, 1566.' Among others are 'Last Moments of Anne Boleyn,' 'The Introduction of Rubens to Charles I. of England,' 'Masaniello,' 'Raphael and La Fornarina.'

Biel, bēl, Gabriel, German philosopher: b. Spire, about 1442; d. Tübingen, 1495. He was educated at Heidelberg and Erfurt; and became a cathedral preacher in Mainz. In 1477 he was made provost of Urach, and an adviser in the founding of the University of Tübingen, where he became professor of theology, in 1484. He has been erroneously called 'the last of the Schoolmen.' His principal work was 'Collectorium ex Occamo.'

Biela, bē'la, Wilhelm von, Austrian officer and astronomer: b. Rossla, 19 March 1782; d. Venice, 18 Feb. 1856. On 27 Feb. 1826, he discovered at Josephstadt, Bohemia, a new comet which, a few days later, was sighted by Gambart from Marseilles. Both noticed its similarity to comets appearing in 1772 and 1805, and fixed its period at between six and seven years; but it was named after Biela, who had first discovered it. Shortly after its reappearance at the end of 1845 it was seen to divide into two portions, each of which afterward developed a tail and a brilliant nucleus, features wanting in the original body. In August 1852 the double comet reappeared, but this time the two portions were much farther apart; and not long after the comet vanished, and has never been sighted since.

Biela's Comet, a comet of short period, named after its discoverer, Wilhelm von Biela (q.v.), who discovered it in 1826 and furnished such data regarding its movements as to convince the other astronomers of his day that he had a proprietary right to it. The same comet had been noticed 8 March 1772, and again in

1805. It was reckoned that the comet had passed its perihelion six times between the two periods without being detected by the astronomers. On another visit it passed out of sight on 3 Jan. 1833. Its next appearance was in July 1839. It was found again late in November 1845, and in the following month an observation was made of one of the most remarkable phenomena in astronomical records, the division of the comet. It put forth no tail while this alteration was going on. Prof. Challis, using the Northumberland telescope at Cambridge, on 15 Jan. 1846, was inclined to distrust his eyes or his glass when he beheld two comets where but one had been before. He would call it, he said, a binary comet if such a thing had ever been heard of before. His observations were soon verified, however. Late in August 1852, the larger came into view and three weeks later the smaller one, now much fainter than its former companion, was seen about 1,500,000 miles in the lead. Schiaparelli's investigations showed it to be probable that the comet is the illuminated central mass of a stream of meteorites. The Leonid stream of meteors revolves around the sun in a period of 33¼ years, and the earth passes their orbit every year, but meets the main swarm only when passing the point of intersection of the two paths. On 12 Nov. 1799, 13 Nov. 1833, and 14 Nov. 1866, the earth is known to have encountered a dense portion of the stream. Astronomers looked for the reappearance of this stream of meteors 13-14 Nov. 1899, but were disappointed, only a few stray meteors putting in an appearance.

Bielaga, a Russian name for the great European sturgeon (*Acipenser huso*), also called "hausen" and "huso." See STURGEON.

Bielaya, byēl-ā-yā, the name of 10 Russian rivers, the most important of which is about 500 miles in length, rises in the Ural ridge and flows northwest to the Kama River. From April to November it is navigable from its mouth to the city of Uta, about 200 miles, regular trade in minerals, lumber, and salt being carried on. Of the other rivers of this name, may be mentioned the one in the government of Irkutsk, Siberia, which is a branch of the Angara; and another in the government of Yekaterinoslav which flows through a coal region.

Bielefeld, bē'lē-felt, a town of Prussia, in the province of Westphalia, at the northern foot of the Teutoburger-Wald, 38 miles east from Münster. The river Lutter divides it into an old and a new town. The best German linens are manufactured here, flax-spinning and bleaching are largely carried on, and there are various other industries, among which some of the chief are shirt-making, silk-weaving, the manufacture of cycles and sewing-machines, and of cigars, glass, cement, leather, etc. It contains a gymnasium, two hospitals, and other public buildings. The castle of Sparenburg, built in 1017, is in the immediate vicinity, and since its recent restoration has been occupied as a museum. Pop. about 65,000.

Bielefeld, a small town in Westphalia, Germany, with 50,000 inhabitants. Particularly noted as containing the Bethel colony for epileptics.

Bielgorod, byēl'gō-rōt. See BELGOROD.

BIELO-OZERO — BIERNATZKI

Biëlo-ozero, byël-ô-ô'zà-rô ('white lake'), a lake of European Russia, in the government of Novgorod, whose outflow is carried by the Cheksna River to the Volga. It is of a somewhat circular form, and has an area of about 430 square miles. A system of canals connects it with Lake Onega, the Dwina, and other rivers, and fishing is carried on in it.

Bielowski, byë-lôw'ske, **Augustus**, Polish poet: b. Krechowice, Galicia, 1806; d. 1876. Among his poetical compositions is to be mentioned the historical rhapsody, 'Lay of Henry the Pious.' He wrote a 'Critical Introduction to the History of Poland' (1850), but his principal work was the publication of 'Monumenta Polonise Vetustissima' (1864-72); a collection of Polish chronicles up to the time of Duigoz, since his death continued by the Cracow Academy of Sciences.

Bielshöhle, bëlz'hél-ë, a stalactite cavern in the Bielstien Mountain Harz, on the right bank of the Bode. It was discovered about 1672, but first made accessible in 1788. Its entrance is 108 feet above the bed of the stream; and its total length is 230 yards.

Bielski, byël'ske, **Marcin**, Polish historian: b. Biala, near Sieradz, 1495; d. there, 1575. His 'Kronika swiata' and 'Kronika Polska' (1550 and 1564), contain the first comprehensive attempt at a history of Poland. He wrote two satirical poems, 'Sen majowy' (1590), and 'Seym niewiesci' (1595), picturing, in the one, the degradation of Hungary, and calling upon his countrymen to exhibit a nobler spirit than the Hungarians, while the other gives a keen analysis of the condition of Poland in his days. A strategical work of his, 'Sprawa rycerska' (1569), gives valuable information upon the condition of the Polish army, and the character of Polish tactics. After serving in the army, and taking part, in 1531, in the battle of Obertyn, he devoted himself for the rest of his days to literary pursuits. In 1617 the bishop of Cracow interdicted his 'Chronicles,' as they were suspected to contain heterodox sentiments.

Bienne, byën, **Lake of**, called in German, Bielersee, a Swiss lake about 10 miles long by 3 broad, with a depth of 30 fathoms. Its scenery is more beautiful than bold. Being eight feet below the level of Lake Neufchâtel, it receives its waters by the Thiel and discharges itself into the Aar. On the islet of St. Pierre, in this lake, J. J. Rousseau resided for two months in 1765. That the lake was a centre of population from remote times, the remains of numerous pile-dwellings prove. At the northern extremity of the lake is the town of **BRENNE**, superbly seated at the foot of the Jura, surrounded by ancient walls with watch towers at intervals. It is a busy manufacturing place, its industries including watch-making, cotton-spinning, tanning, dyeing, book-binding, etc. A railroad connects it with Nidau and Boujean and cable roads ascend the mountains near by. The town contains among other institutions, the Wert Swiss Technical Institute, with its school for railroad employees, and a watchmakers' school. Pop. about 22,100.

Biennials, in botany, plants which do not produce flowers and fruit during the first year of growth, but store up a stock of nourishment in a thickened stem or root, whence they draw the material for the growth of the second year, dur-

ing which flowers and fruits are developed and the plant dies. Several of our commonest food-plants, such as turnip, cabbage, and carrot, are biennials. Under special circumstances, favorable to rapid growth, a plant, ordinarily biennial, may become an annual.

Bienteveo, byän-tä-vä'ô, a flycatcher of southern South America, related to our kingbird and familiar about the villages and gardens of the Argentine Republic. Its name comes from its loud and cheerful cry, which resembles the Spanish phrase *Bien te Vëo*, 'I see you well.' Unlike its relatives elsewhere, it erects a domed nest of so elaborate a construction that it sometimes takes weeks of work to build it.

Bienville, Jean Baptiste le Moyné, byän-vel, zhôn bâptëst lê mwän (SIEUR DE), French colonist: b. Montreal, 23 Feb. 1680; d. 1765. In 1698, with his brother, Iberville, he left France to found a colony at the mouth of the Mississippi. In 1700 he constructed a fort 54 miles above the mouth of the river, and in 1701, at the death of Sauvolle, a second brother, he succeeded to the direction of the colony, the seat of which became Mobile. In 1718 he received a commission as governor of Mississippi, and about this time founded the city of New Orleans. In 1724 he was summoned to France, and, on 9 Aug. 1726, was removed from office. In 1733 he was sent back to the colony as governor, with the rank of lieutenant-general. In 1743 he was again removed and returned to France, where he died.

Bierbaum, bër'bowm, **Otto Julius**, German poet: b. Grüneberg, Silesia, 28 June 1865. He is a rising man of letters; his 'Songs of Experience' (or 'Poems That Were Lived') (1892), is as yet his most noteworthy volume. Other works of his are 'Studentenbeichten' (1897); 'Der sunte Vogel von 1897 und 1899'; 'Ein Kalenderbuch' (1896 and 1898).

Bierce, Ambrose, American author and journalist: b. Meigs County, Ohio, 24 June 1842. He served in the Civil War as a lieutenant of volunteers, and was brevetted major for gallantry. In 1866 he went to California and for 30 years was closely identified with Californian journalism. He edited the 'Argonaut,' and the 'Wasp,' and was a constant contributor to the 'Overland Monthly,' and San Francisco *Examiner*. His publications are 'Cobwebs From an Empty Skull' (1874); 'Black Beetles in Amber' (1892); 'Can Such Things Be?' (1893); 'In the Midst of Life' (1898). His most popular work was originally published at San Francisco (1891), under the title of 'Tales of Soldiers and Civilians'; 'Fantastic Fables' (1899); in collaboration with G. A. Danziger, 'The Monk and the Hangman's Daughter' (1892).

Bierman, Karl Eduard, bër'man, kärl ëd'-oo-ärd, German painter: b. Berlin, 26 July, 1803; d. 16 June 1892. He first took up painting on china and decorative painting, then turned his attention to landscape painting, studying in Switzerland and Italy. He is one of the founders of the Berlin School of Landscape Painting. Perhaps his best-known work is 'Evening in the High Alps'; others are 'View of Florence,' 'Isle of Philæ,' and the 'Temple of Edfu.'

Biernatzki, Johann Christoph, be-er-näts'-ke, yô'hän krîst'ôf, German pietist, poet, and story writer: b. Elmshorn, Holstein, 17 Oct.

BIERSTADT — BIG-HORN

1795; d. Friedrichstadt, 11 May 1840. A country pastor, he devoted himself to the versification of his own precepts and beliefs, the volume 'Faith' being the result. In 'The Brown Boy,' and 'Hallig, or the Adventures of Castaways on an Island in the North Sea,' he displays a not unpleasing capacity for prose narrative.

Bierstadt, bër'stat, Albert, American painter: b. near Düsseldorf, Germany, 7 Jan. 1830; d. New York, 18 Feb. 1902. He removed with his parents to New Bedford, Mass., in 1831; began to paint in oils in 1851; and in 1853 returned to Düsseldorf to study his art, spending a winter in Rome, traveling in Italy and Switzerland, and returning to the United States in 1857. In 1859 he accompanied Gen. Lander's expedition to the Rocky Mountains, and spent several months in studies of mountain scenery. He was elected a member of the National Academy in 1860. In 1861 he finished his painting, 'Laramie Peak,' and in 1863 'View of the Rocky Mountains—Lander's Peak.' These at once gave him a national reputation. Among his many other paintings of American subjects are 'Valley of the Yosemite' (1866); 'El Capitan'; 'Looking Down the Yosemite' (1865); 'Great Trees of California' (1874); 'Geysers' (1883); 'On the Saco, New Hampshire' (1886); 'California Oaks' (1886). 'A Storm on the Matterhorn' is the best known of his Alpine subjects. Bierstadt received many foreign medals and decorations, and was a member of the National Academy of Design from 1860.

Biesbosch, bës'bōs, a marshy sheet of water interspersed with islands, between the Dutch provinces of North Brabant and South Holland, formed in November 1421, by an inundation which destroyed 72 villages and 100,000 people, and spread over an area of 80 square miles.

Blester, João Ernesto, bē'stēr, zhō'own'ēr-nēs'tō, Portuguese dramatist: b. Lisbon, 1829; d. 1880. He wrote some 90 plays, the most noteworthy among them being 'The Nineteenth Century Gentleman,' 'Luck and Labor,' and 'The Scandal Mongers.' He founded the journal 'Revista Contemporanea de Portugal e Brazil' in 1859, and was its first editor. He was for many years the most popular dramatist in Portugal.

Biet, Antoine, byā, ān-twān, French missionary, who in 1652 accompanied 600 colonists to Cayenne, where he remained 18 months. He was the author of 'Voyage de la France Equinoxiale' (1664), with a Galibi dictionary at the end.

Bievre, Maréchal, bē-āv'r, mā-rā-chal (MARQUIS DE), French writer: b. 1747; d. Spa, Germany, 1789. He served in the corps of the French musketeers, was a life-guard of the king of France, and acquired much reputation by his puns and repartees. After publishing several entertaining works, he composed (1783) 'Le Séducteur,' a comedy in verse, for the theatre, which has maintained its place on the stage, although it is bad both in plan and execution. *Mes amis*, he said, dying, *je m'en vais de ce pas (de Spa)*.

Bifrost, bē'frēst ('the trembling way'), in northern mythology the name of the bridge represented as stretching between Heaven and Earth (Asgard and Midgard); really the rainbow. It

was used only by the gods and was guarded by Heimdal.

Big Bend Country, a volcanic plain near the centre of the State of Washington. It covers 4,800 square miles, a third of it being gently rolling, brown loam prairie, suitable for farming, and the rest low hills and plateaus of bunch grass and sage brush, where live stock is ranged. The Columbia River curves round this region, bounding it on the north and west and partly on the southwest for 20 miles, and flowing in a ravine 1,500 feet below the general level. It is traversed by several remarkable chasms, many miles long, and from a furlong to half a league wide, with sheer walls of black basalt 500 feet high. There are a number of wheat farms in the region.

Big Bethel, Va., a village on the peninsula between the York and James rivers; where an unsuccessful attempt, directed by Gen. Butler, was made by Gen. Pierce, with four regiments, to dislodge outposts of Magruder's Confederate encampment at Yorktown, 10 June 1861. The Federal regiments, under Townsend and Bendix, en route for the Big Bethel camp, mistook each other for the enemy, and fired. This created great confusion. Pierce arrived and pushed on to the Confederate earthwork on Back River, destroying the camp at Little Bethel. The Federal troops crossed Back River and charged the earthwork, but were repulsed with considerable loss, Maj. Theodore Winthrop, the well-known novelist, losing his life on this occasion.

Big Black River, an affluent of the Mississippi, which it enters at Grand Gulf, Miss., after flowing about 200 miles, 50 of which are navigable. On 16 May 1863 a battle took place on this stream during Grant's pursuit of Pemberton toward Vicksburg. The Confederates were defeated, and lost heavily both in killed and captured. McClernand, swiftly following the retreating Confederates, came upon them drawn up on both sides of the Big Black River. McClernand led 10,000 Federals, Pemberton, 8,000 Confederates, his main command having gone on toward Vicksburg. McClernand began the fight. He was for a time unsuccessful, but Lawler, discovering a weak spot in the Confederate line, immediately took advantage of it and charged impetuously.

Big Bone Lick, a salt spring, in Boone County, Ky., 11 miles south of Burlington, where fossil remains of mastodons and other extinct fauna have been found. These animals are supposed to have resorted here to lick the salty earth in the vicinity of the spring.

Big-horn, the wild sheep of the mountains of western North America, so called on account of the massive, spiral horns of the ram, which resemble those of the Asiatic argali. They originally ranged throughout the whole mountain system from New Mexico to northern Alaska, and as far down the valley of the Missouri River as the rough country extended. They are still to be found in the loftier and wilder parts of this territory, but remain numerous only about the head-waters of the Yellowstone, and thence northward. Their home is upon the loftiest parts of the ranges, where they find plentiful pasturage between the highest growth of timber, and the snow or ice of

BIG-HORN MOUNTAINS—BIGAMY

the summits; and upon the elevated and rocky plateaus of the Bad Lands of Dakota. In summer they wander about a good deal in small flocks, climbing to the highest points, where a wide out-look enables them to see quickly the approach of an enemy, and where they are least troubled by flies. In winter they are forced to descend somewhat, but rarely enter the forest, finding shelter against the storm in the mountain gorges, and sufficient dried grass upon the wind-swept ridges. Its principal enemy, in the old days, were the pumas and Indian hunters, whose constant pursuit taught it an alertness and wariness which now makes it one of the most difficult animals for the sportsman to approach. The speed, agility, and endurance of this mountaineer, are equal to that shown by any wild sheep or goat of the Alps or the Himalayas, and equally tax the skill and patience of the hunter. Its horns therefore are highly valued as trophies, and its flesh is universally regarded as the best of all western game.

The common Rocky Mountain big-horn (*Ovis cervina*) is a strongly built sheep, standing about 40 inches high. In color, in its summer coat, it is tawny yellow, and in winter, grayish brown, with the face ashy, and a dark line along the spine. The under parts, and a conspicuous roundish patch on the buttocks, are whitish. The horns of the ram are of large circumference at the base, and thick and rugged, with a distinct keel at the outer edge; and sweep around backward into a spiral, which is complete in the largest specimens, and will measure 40 to 42 inches along the outer curve. A smaller and paler variety of Utah and Idaho, is called Nelson's big-horn. In the mountains of British Columbia is found Stone's big-horn, which is larger in size, and much darker in color (almost black, indeed), with comparatively slender horns. A third species, Dall's sheep, belonging to the mountains of central Alaska, is perfectly white, with horns of moderate size, and of a clear amber color. A fourth species, also Alaskan, may prove to be a variety of Dall's, which it resembles, except that a mantle of brownish-gray covers the body, as if a blanket were laid across its back. This last species has been named Fannin's sheep. All these sheep breed once a year, at the beginning of warm weather, usually producing two kids at a birth. They are hardly separable from the argalis of northeastern Asia, and doubtless all are descendants from the same primitive stock. See Mayer, 'Sport with Rod and Gun' (1892); Roosevelt, 'Hunting Trips of a Ranchman' (1883); Baillie-Grohman, 'Fifteen Years' Sport and Life in the Hunting Grounds of Western America' (1900). See also SHEEP.

Big-Horn Mountains, a range of mountains beginning near the centre of Wyoming and running north into Montana, containing heights of from 8,000 to 12,000 feet, and covering 7,500 square miles.

Big Horn River, a river of Montana and Wyoming. It rises in the Rocky Mountains near Fremont's Peak, and flows northeast into the Yellowstone. Along its course is some of the grandest mountain scenery in the world. It is navigable in its lower course, and has a total length of 400 miles. At its junction with the Little Big Horn is Fort Custer.

Big Jaw, or Lumpy Jaw. See ACTINOMYCOSIS.

Big Rapids, Mich., a city and county-seat of Mecosta County, on the Muskegon River, and several important railroads; 56 miles north of Grand Rapids. The river is here dammed in two places, providing a very valuable water-power. The city has the Holly system of waterworks, and an extensive trade in lumber and manufactures of furniture, sash, doors, and blinds, coiled elm hoops, shingles, etc. Among the noteworthy institutions is the Ferris Industrial School. There are daily and weekly newspapers, a private bank, several hotels, and a public library. Pop. (1910) 4,519.

Big Sandy River, a stream forming the boundary between West Virginia and Kentucky, and flowing into the Ohio; having two confluent forks, Tug Fork, that rises in West Virginia, and West Fork, that rises in Kentucky. It is navigable for 100 miles of its lower course and flows through a timber and coal region.

Big Sioux, soo, a stream of South Dakota, uniting with the Missouri near Sioux City, after a course of 285 miles.

Big Spring, Texas, town and county-seat of Howard County, 270 miles west of Fort Worth, on the Texas & P. R.R. It is of importance as a railroad town, the division shops and offices of the Texas & Pacific railroad being situated here. It carries on an active trade in live stock, hides, fruit, and agricultural products. Extensive deposits of salt are found underlying the region, and in the neighborhood is the great spring for which the town is named. Pop. (1910) 4,102.

Big Stone Lake, a body of water in Big Stone County, Minn., drained by the Minnesota River. It is about 25 miles long.

Big Trees. See SEQUOIA.

Big Woods, a wooded tract in the south-east part of Minnesota, extending south from St. Cloud to Le Sueur, where it crosses the Minnesota, and sends branches toward Fari-bault and Mankato. It is 100 miles long and from 10 to 40 miles wide, covering 5,000 square miles, four fifths of which lie north of the Minnesota. This great belt of hardwood timber is one of the most valuable forests in the West.

Bigamy, in the canon law, means being twice married; in the common acceptation of the word, as a term of ordinary law, it means the being married to two wives or husbands at the same time. The laws relating to plurality of wives or husbands might be supposed to come strictly under the head of polygamy; but, as it constitutes an offense against these laws to have more than one husband or wife, they are usually brought under that of bigamy. The laws of every civilized society make some provision respecting this subject. By the statute of 4 Edward I. stat. 3, cap. 5, the marrying of a second husband or wife, the first being alive, was made felony; and by that of 2 James I. cap. 11, this crime was made punishable by death. But the same statute provided that, where either party was absent beyond seas for seven years, whether known or not known to the other party to be alive, or was absent, though not beyond seas, for the same

BIGELOW

period, and not known by the other party to be alive, the other party was at liberty to marry again. Now, however, one of the parties is not held guiltless unless the other was absent continuously for seven years, and was not known to be alive. The penalty has been lessened by subsequent enactments, and the guilty party is now liable to penal servitude for seven years, or not less than five; or to be imprisoned with or without hard labor for not more than two. Every person aiding or abetting the bigamist is held to be equally guilty, and may receive the same punishment. By a Scottish statute of 1551 bigamy was made punishable as perjury—that is, with confiscation of goods, imprisonment and infamy; now, imprisonment is the usual sentence, but in some cases penal servitude is inflicted. If the accused had reasonable ground for believing the first spouse dead, he is not guilty of the crime; and if the first marriage was void for any reason, or dissolved by divorce, the second is not bigamous. In Scotch law, too, it is not necessary that either marriage should be regular for bigamy to be committed. The statute of James I. has been adopted in most of the United States as to the description of the crime; but the State laws generally differ from it as to the penalty, having assigned, heretofore, instead of death, as provided by the English statute, the punishment of imprisonment and hard labor for a number of years, according to the discretion of the court; others leaving it to the verdict of the jury to fix the period of imprisonment.

The New York statutes against bigamy are substantially similar to those in nearly all the States of the Union. These statutes provide that any person who having a husband or wife living, marries another person, is guilty of bigamy, and is punishable in State's prison or a penitentiary for not more than five years. The statute does not extend to a person whose former husband and wife has been absent for five years successively, without being known to him or her within that time to be living, and believed by him or her to be dead; or to a person whose former marriage has been pronounced void, or annulled or dissolved, by the judgment of a court of competent jurisdiction, for a cause other than his or her adultery or to a person who being divorced for his or her adultery, has received from the court which pronounced the divorce, permission to marry again; or to a person whose former husband or wife has been sentenced to imprisonment for life. A person who knowingly enters into a marriage with another which is prohibited to the latter by the statute is punishable by imprisonment for not more than five years, or by a fine of not more than \$1,000, or both.

Bigelow, Edith Evelyn (JAFFRAY), American novelist: b. New York, 23 Dec. 1861; married Poultney Bigelow (q.v.) 1884. She has published 'Diplomatic Enchantments' and several novelettes.

Bigelow, Edward Fuller, American scientist: b. Colchester, Conn., 14 Jan. 1860. He was editor of 'Popular Science' for three years, and of 'The Observer,' a nature magazine, for eight years, and has lectured much on nature themes for the New York Board of Education and in

private and other schools. He has published 'Bigelow's Plant Analysis.'

Bigelow, Erastus Brigham, American inventor: b. Boylston, Mass., 2 April 1814; d. Boston, 6 Dec. 1879. He became a leading manufacturer in Clinton, Mass.; invented looms for suspender-weaving, for counterpanes, for coach lace, and for carpets; and published a textbook on shorthand writing; 'The Tariff Question' (1862), and other works.

Bigelow, Frank Hagar, American clergyman and meteorologist: b. Concord, Mass., 28 Aug. 1851. He graduated at Harvard in 1873, and at the Episcopal Theological School at Cambridge, Mass.; was ordained in 1880, and became assistant rector at St. John's Church, Washington, D. C. In 1873-6 and 1881-3 he was astronomer at the Cordova Observatory, Argentine Republic; in 1884-9, professor of mathematics at Racine College, Wisconsin; in 1893 became professor of meteorology in the United States Weather Bureau, and in 1894, professor of solar physics at Columbian University, Washington, D. C. He has written many articles on solar and terrestrial magnetism, astronomy, and meteorology. His most important contribution to astronomy is a monograph on the solar corona, published by the Smithsonian Institution in 1889.

Bigelow, Jacob, American physician: b. Sudbury, Mass., 27 Feb. 1787; d. Boston, 10 Jan. 1879. He graduated at Harvard College in 1806, and began medical practice in Boston in 1810. He early became known as a botanist, and a number of plants were named for him by Sir J. E. Smith, in the supplement to 'Rees' Cyclopædia,' by Schrader, in Germany, and De Candolle in France. He founded Mount Auburn Cemetery, in Cambridge, the first garden cemetery established in the United States. He was professor of materia medica in Harvard College in 1815-55, and Rumford professor there in 1816-27. His works include 'Useful Arts Considered in Connection with the Applications of Science' (1840); 'Florula Bostoniensis' (1824); 'American Medical Botany' (1817-20); 'Nature in Disease' (1854); 'A Brief Exposition of Rational Medicine,' 'The Paradise of Doctors, a Fable' (1858); 'History of Mount Auburn' (1860); 'Modern Inquiries,' and 'Remarks on Classical Studies' (1867).

Bigelow, John, American author: b. Malden, N. Y., 25 Nov. 1817. He graduated at Union College in 1835, and became first a lawyer and afterward a journalist. In 1845-6 he was inspector of Sing Sing prison; in 1849-61 one of the editors of the New York *Evening Post*; in 1861-4, United States consul-general at Paris; and in 1864-7, minister to France. He was secretary of state of New York 1875-7. In his will Samuel J. Tilden appointed him his biographer and one of the three trustees of the bulk of his estate set apart for the establishment of a public library in New York. On 22 Feb. 1895 a joint committee, representing the Tilden Trust Fund and the Astor and Lenox libraries, agreed on a plan for the consolidation of those interests and the establishment of a great public library to be known as the New York Public Library, Astor, Lenox, and Tilden Foundations. The agreement was ratified by the several interests, an act of incorporation was obtained from the legislature, and on 27

BIGELOW — BIGGE

May Mr. Bigelow was elected president of the consolidated board of trustees, and appointed chairman of the executive committee. His works include 'Molinos the Quietist'; 'France and the Confederate Navy'; 'Life of William Cullen Bryant'; 'Life of Samuel J. Tilden'; 'Some Recollections of Edouard Laboulaye'; 'The Mystery of Sleep'; 'A Life of Franklin.' In 1885 he published 'The Writings and Speeches of Samuel J. Tilden,' and in 1888, 'The Complete Works of Benjamin Franklin.'

Bigelow, John, Jr., American military officer, son of the preceding: b. New York, 12 May 1854. He was educated in Paris, Bonn, Berlin, Freiburg, and Providence, R. I.; graduated at the United States Military Academy in 1877; and was assigned to the 10th United States Cavalry. In 1887-9 was adjutant-general of militia in the District of Columbia; and in 1894-8, professor of military science at the Massachusetts Institute of Technology. During the war with Spain he was wounded in the attack on San Juan, Cuba, 1 July 1898. He published 'Principles of Strategy, Illustrated Mainly from American Campaigns' (rev. ed., 1894).

Bigelow, Marshall Train, American printer and proof-reader: b. South Natick, Mass., 5 Oct. 1822; d. Cambridge, Mass., 28 Dec. 1902. In 1843 he became associated with the University Press in Cambridge, the firm name of which from 1859 to 1879, was Welch, Bigelow & Company. He was long classed as one of the most competent of American proof-readers. He published 'Punctuation and Other Typographic Matters' (1881); 'Mistakes in Writing English and How to Avoid Them' (1886).

Bigelow, Melville Madison, American lawyer: b. Eaton Rapids, Mich., 2 Aug. 1846. He graduated at the University of Michigan in 1866, and engaged in practice in Boston. His works include 'The Laws of Bills, Notes, and Checks'; 'English Procedure in the Norman Period'; 'The Law of Fraud on Its Civil Side'; 'Elements of Equity'; 'Elements of the Law of Torts'; 'Placita Anglo-Normannia'; 'The Law of Wills'; 'The Law of Estoppel'; 'Leading Cases in the Law of Torts,' etc.

Bigelow, Poultney, American author: b. New York (son of John Bigelow), 10 Sept. 1855. He graduated at Yale University, and at the Columbia Law School in 1882, and was admitted to the bar. In 1875-6 he took a voyage around the world in a sailing-ship which was wrecked on the coast of Japan. He traveled in China, Africa, the West Indies, and Demerara. He has made canoe voyages on the principal waters of Europe, and was the first person to take a canoe through the Iron Gates of the Danube. Emperor William II. has been his personal friend since they were students together in Germany. He wrote 'The German Emperor and His Neighbors'; 'Paddles and Politics Down the Danube'; 'The Borderland of Czar and Kaiser'; 'History of the German Struggle for Liberty'; 'White Man's Africa,' etc. He edited the 'Outing' magazine, 1885-7, and has also been correspondent of 'Harper's Weekly' and the London *Times*.

Bigelow, Robert Payne, American biologist: b. Baldwinsville, N. Y., 10 July 1863. He graduated at Harvard in 1887, and studied at

Johns Hopkins 1891-3. In 1893 he became instructor in biology, and in 1895 librarian in the Massachusetts Institute of Technology. He has written a number of papers on zoological subjects.

Bigelow, Timothy, American military officer: b. Worcester, Mass., 12 Aug. 1739; d. there, 31 March 1790. On 23 May 1775 he led a company of minute-men to Cambridge, and became major in Ward's regiment. He was under Arnold in the expedition to Quebec in 1775, and was there captured, remaining a prisoner till 1776. He became colonel in 1777, and assisted in the capture of Burgoyne. He also saw service at Valley Forge, Monmouth, West Point, and Yorktown.

Bigelow, Timothy, American lawyer (son of the preceding): b. Worcester, Mass., 30 April 1767; d. 18 May 1821. He graduated at Harvard College in 1786, was admitted to the bar, and settled in practice at Groton, Mass., in 1789. He took an active part in politics as a Federalist, was for 20 years a member of the State legislature, and 11 years speaker of the House of Representatives, and a member of the Hartford Convention. In 1807 he removed to Medford, and kept an office in Boston. His legal standing and practice were at the head of his profession in his time; and in the course of 32 years, he was supposed to have argued 10,000 causes.

Biggar, Hamilton Fisk, Canadian physician: b. Oakville, Ont., 15 March 1839. He was educated at Victoria University, and pursued his medical studies at the University of Medicine and Surgery, Cleveland, Ohio. In 1866 he began practice in Cleveland, and in 1867 was made professor of anatomy and clinical surgery in the Homœopathic Hospital College there. Later he was for 10 years professor of clinical surgery, with operations in the same college. In 1900 he held the chair of surgical diseases of women and clinical surgery. Dr. Biggar founded the Cleveland Training School for Nurses, where he was dean for 10 years. He wrote 'Twelve Months of Surgery'; 'Loiterings in Europe,' etc.

Biggar, Joseph Gillis, Irish politician: b. Belfast, 1828; d. London, 19 Feb. 1890. He succeeded his father in mercantile business in 1861; entered politics in 1869; and was elected to Parliament for county Cavan in 1874. He was a member of the Supreme Council of the Irish Republican Brotherhood. When Charles Stewart Parnell entered Parliament in 1875 Biggar ranged himself on the side of that leader. He took an active part in the Land League movement. In 1877 he was expelled from the Fenian organization, and in 1880 delivered aggressive speeches in Ireland. He was one of the few prominent Irish members who were never in prison.

Bigge, big, Sir Arthur John, English soldier: b. Stamfordham, 18 June 1849. He entered the Royal Artillery in 1869; served in the Zulu war, 1878-9, with distinction, and in 1879 was appointed aide-de-camp to Maj.-Gen. Sir Evelyn Wood. In 1880 he became groom-in-waiting to the queen and assistant private secretary; in 1881 equerry in ordinary, and in 1895, private secretary and equerry to the queen.

Bigga, Asa, American jurist: b. Williamston, N. C., 4 Feb. 1811; d. Norfolk, Va., 6 March 1878. He received an academical education, and was admitted to the bar in 1831. He was a member of the North Carolina Constitutional Convention in 1835; was elected to the State legislature in 1840, 1842, and 1844; was a member of the commission appointed to revise the State statutes in 1850, and was again sent to the legislature in 1854. In 1854 he was elected United States senator; resigned in 1858, and was appointed judge of the United States District Court of North Carolina.

Biglow, William, American educator and poet: b. Natick, Mass., 22 Sept. 1773; d. Boston, 12 Jan. 1844. He was first established as a teacher in Salem, and in 1799 delivered a poem on education before the Phi Beta Kappa Society at Cambridge. He then took charge of the Latin School, Boston, preaching occasionally, writing for different periodicals, and publishing educational text-books. Here he fell a victim to intemperate habits and was compelled to retire to his home in Natick. In this state of his fortunes it was his habit to lounge about the newspaper offices at Boston, write poetry for his friends, the editors, while the humor lasted, and then return to his rural retreat. He taught, also, a village school in Maine, and in the latter part of his life was employed as a proof-reader in the university printing office at Cambridge. He had a genial and pleasant humor, and was a ready versifier, as well as an agreeable prose-writer. His 'Cheerful Parson' and others of his songs, were much admired by his contemporaries and are well worthy of remembrance. He also published, in 1830, a 'History of the Town of Natick,' and one of Sherburne, Mass. But his best and most numerous writings were in periodicals, the 'Village Messenger,' of Amherst, N. H., which he edited in 1796, the 'Federal Orrery,' and 'Massachusetts Magazine.'

Biglow Papers, two series of satirical poems written by James Russell Lowell, the first appearing in 1848; the second in 1866. They were written in 'Yankee' (New England) dialect, and attracted much attention by their humor. The first series was directed against the Mexican war and slavery; the second dealt with the Civil War.

Bignon, Louis Pierre Edouard, bèn-yôn, loo-ê pè-âr â-doo-âr, French historian and statesman: b. La Meilleraye, 3 Jan. 1771; d. Paris, 5 Jan. 1841. He entered the National Assembly in 1817; became a peer of France in 1837, and wrote a 'History of France' (7 vols., 1827-38). He received from Napoleon I. a bequest of \$20,000.

Bigno'nia, the type-genus of the natural order *Bignoniaceæ*, consisting of more than 100 species of mostly South American tropical climbing shrubs, many of which are raised in green-houses for their ornamental foliage and handsome tubular flowers of various colors. Some species are used as cordage in South America and are said to be employed in making mats, baskets, etc. The cultivated species are generally of easy management if given good soil, plenty of light, and space for both roots and tops. *B. capreolata*, which has numerous orange-red flowers, is a common climber through-

out the South and as far north as Maryland. In favorable soils and situations it often attains heights exceeding 50 feet. It is known as 'trumpet-flower' from the shape of its blossoms, and 'cross-vine' and 'quarter-vine' from the appearance of the cross-section of its stem. It is sometimes confounded with its near relative, *Tecoma radicans*, trumpet-vine (q.v.).

Bigordi, Domenico, bē-gôr-dē, dô-mên-ē-kō, Italian painter: b. Florence, 1449; d. Florence, 11 Jan. 1494. He was nicknamed GHIRLANDAJO; teacher for a time of Michael Angelo and Granacci; founder of a new school of painting; painted chiefly sacred subjects; and executed notable frescoes in Rome, Florence, and other cities. His 'Adoration of the Magi,' a panel in the Church of the Innocents, and the 'Annunciation,' on a cathedral entrance in Florence, are among his best works.

Bihacs, or Bihatch, bē-hāčh', a fortress of Bosnia, on an island of the Unna, about 50 miles east of the Adriatic. It has a low and unhealthy site, but is remarkable for its strength. The possession of it has often been keenly contested during the Turkish wars.

Bihé, bē-hā', South Africa, a fruitful district lying east of Benguela, and under Portuguese influence. It is an important caravan centre, as the only route across the Continent passes through it. Area, 3,900 square miles. Pop. 95,000.

Bijanapur, bē-jā-nā-goor', or **Vijayanagara**, otherwise HAMPI, India, an ancient city, now in ruins, in Bellary district, Madras, 30 miles northwest of Bellary. It stands in a plain, surrounded by enormous masses of granite, and covers an area nearly eight miles in circuit. On the north and west it is washed by the Tungabhadra, and in other directions is enclosed partly by natural precipices and partly by strong stone walls. Among its edifices are a magnificent temple of Vishnu, with a pyramidal portico about 160 feet high, divided into 10 stories; another temple, also entered through a painted pyramidal portico; and one of Rama, with pillars of black hornblende covered over with elaborate mythological sculptures. These buildings, and many others besides, are in the purest style of Hindu architecture. Its ruin was effected by a confederation of Mohammedan rajahs, who took and sacked it in 1564.

Bijapur, bē-jē-pōr', India, a decayed city in the Bombay presidency, 160 miles southeast of Poona. It was for centuries the flourishing capital of a powerful kingdom, but fell therewith under various dynasties in succession, Hindu and Mussulman, till in 1686 it was captured by Aurungzebe. It passed, during the early part of the 18th century, into the hands of the Marattas, and became British in 1848. Now that a gradual decay has done its worst, Bijapur presents a contrast perhaps unequaled in the world. Lofty walls of hewn stone, still entire, enclose the silent and desolate fragments of a once vast and populous city. With the exception of an ancient temple, the sole relic of aboriginal domination, the ruins are Mohammedan, and consist of beautiful mosques, colossal tombs, a fort, with an inner citadel, a mile in circuit. The British government has done everything to prevent further decay.

Bijns, bînz, **Anna**, Flemish poet: b. Antwerp, 1494; d. there, 10 April 1575. Much admired for her melodious verses, full of metaphors and showing great technical skill, she was styled the 'Brabantine Sappho' by her contemporaries. The first of her volumes of collected verse bore the title 'This Is a Beautiful and Truthful (or Sincere) Little Book,' while a second is known as 'Spiritual Refrains.'

Bikanir, bê-kā-nēr', India, a native state of Rājputāna, under the superintendence of a political agent and the governor-general's agent for Rājputāna, lying between lat. 27° 12' and 30° 12' N. and lon. 72° 15' and 73° 50' E.; area, 23,173 square miles; pop. 831,955. In the whole country there is not a constant stream, the main dependence of the people being on wells of poor brackish water which is drawn from depths of 250 feet and upward, yet large flocks of sheep are kept. The country is subject to extremes of temperature in each 24 hours.

Bikanir, India, capital of the above state, an irregularly built city surrounded by a fine wall three and a half miles in circuit. It has a fort, containing the rajah's palace, and manufactures blankets, sugar candy, pottery, etc. Pop., including suburbs, 56,252.

Bikelas, Dimitrios, bê-kā'las, dê-mē'trê-ōs, Greek poet and essayist: b. Hemopolis, island of Syra, 1835; d. Athens, 21 July 1908. After completing his studies he went to London, where his parents had settled, and after 1874 lived in Paris. After publishing a collection of his poems in 1862, he devoted himself to the task of making Shakespeare's dramas known in Greece through excellent metrical translations. As a prose-writer he has won wide reputation with his tale, 'Lukis Laras' (1879), which was translated into 13 languages.

Bilbao, bêl-bā'o, Spain, capital of the province of Biscay (q.v.) or Bilbao, situated on the navigable Nervion, in a plain surrounded with high mountains, a few miles from the sea. The river is crossed by four bridges. The town is picturesque, and well built, and contains several good churches, two fine promenades, a theatre, a marine school, etc. Bilbao carries on an important trade and manufactures (the latter consisting chiefly of sailcloth, ropes, and leather), and possesses large shipyards and iron-foundries, iron and steel works, etc. It is one of the most flourishing seaports of Spain, though its accommodation for shipping is defective, and it is the seat of a United States consul. Various harbor improvements, however, have recently been carried out, including a breakwater and mole. Bilbao exports much iron ore (especially to the United Kingdom), also pig-iron, wool, wine, etc.; the imports are manufactured goods, dried fish, timber, coal, etc. Its supply of water and sanitary arrangements are not good. Pop. about 84,000.

Bilberry. See HUCKLEBERRY.

Bilbilis, Spain, an old Iberian city, two miles east of the modern town of Calatayud, in the province of Saragossa, chiefly celebrated as the birthplace of the poet Martial, but also famed for its highly tempered steel blades.

Bilderdyk, bil'der-dik, **William**, Dutch poet: b. Amsterdam, 7 Sept. 1756; d. Haarlem, 18 Dec. 1831. He studied at Leyden, and in 1776 obtained from the learned society of Leyden

the first prize for a poem on the influence of poetry upon governments. In 1780 he obtained another prize for a poem on the connection of poetry and eloquence with philosophy. Bilderdyk, besides, devoted himself to law, at The Hague, with great success. On the invasion of the Netherlands by the French he left his country and removed to Brunswick, where he studied the German language and poetry, and afterward to London, where he delivered, in French, lectures on literature and poetry. In 1799, after the new order of things was firmly established in Holland he returned, and soon afterward published some of his principal works. Among these are a didactic poem on astronomy, and masterly imitations of Delille's 'L'Homme des Champs,' and Pope's 'Essay on Man.' Louis Bonaparte, on his accession to the throne, appointed him his teacher of Dutch, and one of the first members of the national institute founded by him. Bilderdyk produced a number of war-songs, which are considered to be among the best in Dutch poetry.

Bile, the most important secretion of the liver. It is formed directly by the liver cells, largely from the blood, is collected by the bile ducts, and discharged through the hepatic ducts. Most of the bile is stored in the gall-bladder, from which it is discharged in man by the cystic duct and the common duct into the upper portion of the duodenum, four inches below the lower end of the stomach. As first secreted in man it is a clear limpid fluid, but in the gall-bladder it is mixed with mucin and becomes darker, varying from dark brown to greenish, according to the amount of oxidation of the bile pigments. The bile of the carnivora is usually yellowish in tint, that of the grass-eaters greenish, but the colors vary widely, dependent on the oxidation. Bile is an alkaline fluid with a bitter taste, and contains water, alkaline salts of bile acids, bile pigments, traces of lecithin, cholesterin, soaps and fats, and mineral salts. The proportions of these are very variable. The acids are known as glycocholic acid, yielding glycocholl and cholalic acid, and taurocholic acid, yielding taurine and cholalic acid. The pigments are two, bilirubin and biliverdin, and the color is a compound of the colors of these two and varies with the proportion of each from reddish-brown to grass-green. They are thought to be derived from the hemoglobin of the blood. The functions of bile are not clearly understood, but it seems to aid in the digestion of fats; it is an important organ of excretion, getting rid of many broken down products of metabolism, notably the cholestrin and lecithin. It is an efficient antiseptic, reducing the amount of excessive fermentation in the intestines, it aids in peristalsis and thus overcomes constipation, and perhaps has other functions connected with proteid digestion. The amount of bile secreted daily varies from 25 to 50 ounces, its secretion is more or less uniform, but at the digestive periods the stored bile of the gall-bladder is added to the intestinal contents. Gall-stones result from concentration of the bile in the gall-bladder. They are also formed as a process of infection of the gall-bladder that creeps up from the duodenum. Gall-stones following typhoid fever are very common, and are probably formed in this manner. As a result of inflammation of the stomach and duodenum the common duct sometimes is inflamed and its walls

BILFINGER — BILL

swollen. This prevents the escape of bile into the intestines and the bile pigments are taken up by the blood and cause the familiar symptom of jaundice (q.v.). Biliousness, so called, is rarely an affection of the liver, but much more often a mild inflammation of the stomach and intestines with catarrhal obstruction of the common duct that is not severe enough to dam back the bile entirely. Clayey stools are usually indicative of deficient bile-elimination. The best-known stimulants of bile-formation and bile-elimination are heat and the biliary acids themselves. The vast majority of the numberless patent liver-pills on the market have no influence on the liver whatever; they are simply cathartics and empty the bowels. Consult Schaefer, 'Physiology' (1898). See DIGESTION; GLYCOGEN; JAUNDICE; LIVER.

Bilfinger, Georg (gā-orn') Bernhard, German philosopher and mathematician: b. Canstadt, Württemberg, 23 Jan. 1693; d. Stuttgart, 18 Feb. 1750. He was born with 12 fingers and 12 toes, and submitted to an operation which removed the deformity. He studied with Wolf at Halle and became a disciple of the school of Wolf and Leibnitz. In 1725 he received an invitation from Peter the Great to the chair of logic and metaphysics in the new college at St. Petersburg. He now solved the problem of the cause of gravity proposed by the Academy of Sciences at Paris, and gained the prize. Being recalled by Duke Charles Edward of Württemberg he returned to Tübingen and proceeded to lecture on theology; here his originality in style and ideas soon made him popular, and in 1735 he was appointed a privy councilor. Here he displayed great administrative ability, and by severe study soon became as celebrated for his political and statistical knowledge as for his scientific attainments. He afterward paid particular attention to agriculture and promoted the culture of the vine. He was the author of numerous theological and philosophical works.

Bilguer, Paul Rudolf von, bīl'gwēr, powl roo-dōlf fōn, German chess-player: b. Schwerin, 1808; d. Berlin, 6 Oct. 1840. He entered the Prussian army in 1833, and shortly afterward was promoted lieutenant. On 18 March 1840 he performed at Berlin the curious feat of playing three games at once with as many different opponents, conducting two of the contests without seeing the boards and men. This intense mental effort is supposed to have been the primary cause of the illness which resulted in his death. His 'Chess Handbook' (Berlin, 1843 and 1852), completed after his death by his friend T. Heydebrandt von der Lasa, made an epoch in the history of chess, and is still the best practical work on that game.

Bilharzia, a parasitic worm, *Bilharzia hematobium*, very common in Egypt and South Africa, but rare in the United States. The symptoms are usually those of cystitis, or inflammation of the bladder, with bloody urine. The diagnosis is usually made by finding the ova of the worm in the blood, by the microscope. See PARASITES.

Bilim'bi. See BLIMBING.

Bilin, bē-lēn', Bohemia, a town and health resort seven miles south-southwest of Teplitz. It contains a fine old castle built in 1680, and one of more modern date; several churches,

chapels, mills, etc. Within one mile of the town are much-frequented mineral springs, from which much water is exported. The salts and magnesia obtained from the water form important articles of commerce. It is an alkaline water, and is used with advantage in certain concretionary disorders. Here is also the singular basaltic rock called Biliner Stein. Pop. about 7,800.

Bilious Fever, an old name given to a variety of conditions, but in all of which there was characteristic low-grade fever associated with a certain amount of jaundice, clayey stools, headache, foul tongue, etc. It probably represents no one disease, but a complication of many diseases. See BILIOUSNESS; GASTRITIS; INFLUENZA; MALARIA.

Bill, or BEAK. See BEAK.

Biliousness, a popular term to express some affection of the liver, but in all probability a condition of disturbed gastric and duodenal digestion, and having nothing whatever to do with the liver. In the article on bile (q.v.) the passage of this liver secretion into the hepatic duct and storage in the gall-bladder and subsequent emptying into the duodenum, is described. When the stomach is inflamed, this usually extends a certain distance into the intestines and as a consequence the mucous membrane of the common ducts also becomes inflamed and swollen. This prevents the free passage of bile into the intestines and therefore its important function in digestion is stopped or diminished. This results in further indigestion, and causes constipation, and increased putrefaction of the intestinal contents results. Thus there is a chain of many links formed that results in headache, heaviness, bloating, constipation, foul tongue, foul breath, dark urine, and in severe cases mild jaundice. The entire series may have been set in motion by over-eating, or drinking alcoholic liquors, or deficient exercise, eating excessively of fatty (so-called rich) food, or other hygienic misbehavior. Any or all have started the mild inflammation of the stomach or intestines, and the biliary flow has been diminished. The trouble thus has nothing to do with the liver. The treatment should take into consideration the cause. Rest, careful dieting, plenty of water, some mild laxatives, heat over the pit of the stomach, and hot water enemas, will usually right the condition. The free washing of the bowels and the laxative will usually cure the symptoms of poisoning, headache, and heaviness. Dosing with patent pills and teas are to be condemned. They usually contain violent cathartics that irritate the stomach and intestines. While they empty the bowels and thus get rid of the poisoning symptoms, they leave behind or increase the conditions which permit of further trouble. See AUTO-INTOXICATION; BILE; CONSTIPATION; DIGESTION; LIVER.

Bill, Brownbill, Glaive, Voulge, or Gisarme, all names for nearly the same instrument, which, with some slight modification, was the standing weapon of the English infantry at close quarters, as was the long-bow their weapon at distant range, from the days of the battle of Hastings, at which the Saxons used the bill and the Normans the bow, until those of Queen Elizabeth. The original brownbill was a ponderous cutting weapon with two edges, that

BILL

forward of the shaft having a concave or sickle blade, that to the back, a sort of angular cutting face, the upper part projecting before the base, so as to give a drawing blow. This terrible instrument was nearly three feet long, and 10 or 12 pounds in weight, set erect on a shaft of three or four feet. It was wielded with both hands, and could sever a horse's head or a man's thigh or shoulder, through the strongest mail or plate armor, as a modern woodman's bill-hook slices off a hazel sapling. The weapon was afterward lengthened and lightened, and provided with a spear head, so that the holder could charge it like a lance, and sometimes with a cutting hook, for severing bridles or pulling men out of their saddles.

Also a cutting instrument, hook-shaped toward the point, or with a concave cutting edge; used by plumbers, basket-makers, gardeners, etc.; made in various forms and fitted with a handle. Such instruments, when used by gardeners for pruning hedges, trees, etc., are called hedge-bills or bill-hooks.

Bill, a paper, written or printed, giving a statement of the particulars of an account or action. A printed proclamation, an advertisement, an act of Congress or parliament, or a tradesman's account is a bill.

In Legislation.—A term used to signify a special act passed by the legislature in the exercise of a *quasi* judicial power. Thus, bills of attainder, bills of pains and penalties are spoken of. The draft of a law submitted to the consideration of a legislative body for its adoption or rejection. The Constitution of the United States provides that all bills for raising revenue must originate in the House of Representatives, but the Senate may propose or concur with amendments as on other bills. Every bill before it becomes a law must be approved by the President of the United States, or within 10 days returned, with his objections, to the House in which it originated. Two thirds of each House may then enact it into a law. These provisions are copied in the constitutions of a majority of the States.

Bill of Adventure.—A writing signed by a merchant, in which he states that certain goods shipped in his name really belong to another person, at whose risk the adventure is made.

Bill of Attainder.—A bill declaring that the person named in it is attainted and his property confiscated. The Constitution of the United States declares that no State shall pass any bill of attainder. During the Revolutionary War, bills of attainder and *ex post facto* acts of confiscation were passed to a wide extent. The evils resulting from them, in times of cooler reflection, were discovered to have far outweighed any imaginary good.

Bill of Costs.—A statement of the items which form the total amount of the costs of a suit or action. This is demandable as a matter of right before the payment of the costs.

Bill of Credit.—A letter sent by an agent or other person to a merchant, desiring him to give the bearer credit for goods or money. It is frequently given to one about to travel and empowers him to take up money from the foreign correspondents of the person from whom the bill or letter of credit was received.

Bill of Entry.—A written account of goods entered at the custom-house, whether imported or designed for exportation.

Bill of Exceptions.—A bill of the nature of an appeal from a judge who is held to have misstated the law, whether by ignorance, by inadvertence, or by design. This the judge is bound to seal if he be requested by the counsel on either side so to do. The exceptions noted are reviewed by the court to which appeal is taken, and if the objections made to the rulings of the trial judge are well founded, the finding in the case is reversed, and usually the cause is remanded for a new trial.

Bill of Exchange.—A bill or security originally introduced for enabling a merchant in one country to remit money to a correspondent in the other. It is an open letter of request from one man to another, desiring him to pay to a third party a specified sum and put it to the account of the first.

Bill of Health.—A certificate given to the master of a ship clearing out of a port in which contagious disease is epidemic, or is suspected to be so, certifying to the state of health of the crew and passengers on board.

Bill of Indictment.—A written accusation made against one or more persons having committed a specified crime or misdemeanor. It is preferred to and presented on oath by a grand jury. If the grand jury find the allegations unproved, they ignore the bill, giving as their verdict, "Not a true bill"; if, on the contrary, they consider the indictment proved, their verdict is a "True bill."

Bill of Lading.—A document by which the master of a ship acknowledges to have received on board his vessel, in good order and condition (or the reverse), certain specified goods consigned to him by some particular shipper, and binds himself to deliver them in similar condition,—unless the dangers of the sea, fire, or enemies prevent him,—to the assignees of the shipper at the point of destination, on their paying him the stipulated freight.

The bill of lading should contain the name of the shipper or consignor; the name of the consignee; the name of the vessel and her master; the places of shipment and destination; the price of the freight, and in the margin, the marks and numbers of the things shipped. It is usually made in three or more original parts, one of which is sent to the consignee with the goods, one or more others are sent to him by different conveyances, one is retained by the merchant or shipper, and one should be retained by the master. It is assignable by indorsement, and the assignee is entitled to the goods, subject to the shipper's right of stoppage *in transitu* in some cases, and to various liens. It is considered to partake of the character of a written contract, and also that of a receipt. In so far as it admits the character, quality, or condition of the goods at the time they were received by the carrier, it is a mere receipt, and the carrier may explain or contradict it by parol; but as respects the contract to carry and deliver, it is a contract, and must be construed according to its terms. 3 N. Y. 322; 6 Mass. 422. Under the admiralty law of the United States, contracts of affreightment entered into with the master in good faith and within the apparent scope of his authority as master, bind the vessel to the merchandise for the performance of such contracts in respect to the property shipped on board, irrespective of the ownership of the vessel, and whether the master

be the agent of the general or special owner, but bills of lading for property not shipped, and designed to be instruments of fraud, create no lien on the interest of the general owner, although the special owner was the perpetrator of the fraud. Under a bill of lading in the ordinary form, having no stipulation that the goods shipped are to be carried on deck, there is a contract implied that the goods shall be carried under the deck, and parol evidence to the contrary will not be received. 14 Wend. 26. But evidence of a well-known and long-established usage is admissible, and will justify the carriage of goods in that manner.

Bill of Rights.—A bill which gave legal validity to the claim of rights, that is, the declaration presented by the Lords and Commons to the Prince and Princess of Orange on 13 Feb. 1688, and afterward enacted in Parliament when they became king and queen. It declared it illegal, without the sanction of Parliament, to suspend or dispense with laws, to erect commission courts, to levy money for the use of the Crown on pretense of prerogative, and to raise and maintain a standing army in the time of peace. It also declared that subjects have a right to petition the king, and, if Protestants, to carry arms for defense; also that members of Parliament ought to be freely elected and that their proceedings ought not to be impeached or questioned in any place out of Parliament. It further enacted that excessive bail ought not to be required, or excessive fines imposed, or unusual punishment inflicted; that juries should be chosen without partiality; that all grants and promises of fines or forfeitures before conviction are illegal; and, that, for redress of grievances and preserving of the laws, Parliament ought to be held frequently. Finally it provided for the settlement of the Crown. In the United States, a bill of rights, or, as it is more commonly termed in this country, a declaration of rights, is prefixed to the constitutions of most of the States. See UNITED STATES—STATE CONSTITUTIONS OF THE.

Bill of Sale.—A deed of writing, under seal, designed to furnish evidence of the sale of personal property. It is necessary to have such an instrument when the sale of property is not to be immediately followed by its transference to the purchaser. It is used in the transfer of property in ships, in that of stock in trade, or the goodwill of a business. It is employed also in the sale of furniture, the removal of which from the house would call attention to the embarrassed circumstances of its owner; hence the statistics of the bills of sale act as an index to measure the amount of secret distress existing in times of commercial depression. In not a few cases bills of sale are used to defeat just claims against the nominal or real vendor of the goods transferred.

Bill of Sight.—A form of entry at the custom-house by which one can land for inspection, in presence of the officers, such goods as he has not had the opportunity of previously examining, and which, consequently, he cannot accurately describe.

Billaud-Varenne, Jacques-Nicolas, bē-yō-vā-rēn, zhāk-nē-kō-lār, French revolutionist: b. Rochelle, 23 April 1756; d. 3 June 1819. He was bred to the legal profession, and having come in 1785 to Paris, political events soon

began to occupy his attention, and in 1789 three treatises appeared from his pen, entitled respectively 'Despotisme des Ministres de France'; 'Dernier Coup Porté aux Préjugés et à la Superstition'; and 'Le Peintre Politique.' Another publication, 'Acéphalocratie,' which appeared in 1791, subjected him to a judicial prosecution, and he was obliged to conceal himself for a time. He emerged from his retreat on the triumph of his party in September 1791, and in 1792 was elected a member of the National Convention. On the trial of the king he voted for execution within 24 hours. He contributed to the overthrow of the Girondists, and was subsequently chosen president of the convention, and member of the Committee of Public Safety, and in that capacity framed the Bulletin des Lois and assisted in organizing the revolutionary government. In 1795, on a reaction having taken place against the ultra party, he was arrested, and along with Collot d'Herbois, banished to Cayenne. On the overthrow of the directorate he refused the amnesty offered by Bonaparte. In 1816, on the restoration of Cayenne to France, he was obliged to take refuge at Port-au-Prince, in the island of St. Domingo. Here he died in poverty.

Billaut, Adam, bē-yō, ā-dān, or Maitre Adam, French poet: b. early part of the 17th century; d. 1662. A carpenter by trade, he wrote rude but original poems, the gaiety of which, together with the contrast they afforded with his occupation, made them very popular at the time. Voltaire called him "Vergil with the Plane." The three collections of his poems were entitled 'The Pegs'; 'The Centre-Bit'; and 'The Plane.'

Billbergia, a genus of about 40 species of evergreen epiphytes of the natural order Bromeliaceae, natives of South America and often cultivated in greenhouses for their showy flowers.

Bille, bē'le, Steen Andersen, Danish naval officer: b. Copenhagen, 5 Dec. 1797; d. Copenhagen, 7 May 1883. He was a member of the expedition that went to South America in 1840, and had command of a scientific expedition round the world in the corvette Galatea, 1845-7. In his 'Beretning om Corvetten Galatheas Reise Omkrung Jorden, 1845-6 og 47' (1849-51) he has given an account of this expedition.

Billet, the term given to a molding frequently introduced in mediæval architecture, consisting of a torus ornamented by alternate checkers, like a staff cut into short lengths and disposed horizontally or around a molding, and of another molding, composed of a series of small projections, arranged around a curve in alternate directions, but in a consecutive manner.

Billeting of Soldiers, the compulsory lodging of soldiers with the inhabitants of a town, formerly a frequent practice whenever there was a deficiency of accommodation in barracks or regular quarters. The billeting of soldiers on private householders is now abandoned generally, and billeting is reduced as much as possible by camping out and other arrangements. In the United States the practice is regulated by the third constitutional amendment.

Billfish, any of several fishes having notably long, beak-like snouts, as a gar, needle-fish, or spearfish (qq.v.).

BILLIARDS

Billiards, the generic name of a group of games; is played in the United States usually on a 5x10 table, fitted on each side and at the ends with rubber acting as cushions. Ivory balls driven by a wooden cue and varying in size from 2 5-16 inches to 2 7-16 inches are generally used. The bed of the table is slate, from 1¼ to 1¾ of an inch in thickness, and covered, as is also the rubber, with green cloth. The body of the table and legs, and the rails, are made from various designs of wood.

The origin of the game of billiards is shrouded in mystery, but is known to have been played in a crude way since before the birth of Christ. It is mentioned in Shakespeare's 'Anthony and Cleopatra' (1607), and it is now generally agreed that the immortal bard, in his researches for facts, had read of billiards before the birth of our Saviour. Cathire More, a sub-king of Ireland, as early as 148 A.D., speaks of billiards and billiard balls of brass. In the Confessions of St. Augustine, born 430 A.D., mention is made of the game of billiards. From this time until the end of the 14th century very little is known of the game. It is mentioned in Spencer's 'Mother Hubbard Tales' (1591). About this time the French made it an indoor table game by playing it on a square table with pockets at each corner, and one in the center of each side, a little cone in the centre of the table called the "king," and an arch of ivory, known as the "port." Certain scores depended on passing the "port" and touching the "king." As early as 1734, as stated in Seymour's 'Court Gamester' these features of the game had disappeared, and cues had begun to replace the "mast" or "mace" first used. Billiards came into fashion in the time of Louis XIV., whose physicians recommended him this kind of exercise after eating. Some profess to believe the game of English origin, as the earliest and fullest description of billiards is found in Cotton's 'Complete Gamester' (1674). The bed of the table was then made of oak, sometimes marble. Slate beds were first used about 1827. The pockets of the tables at that time, called "hazards," were at first made of wooden boxes, nets being employed soon afterward.

The billiard table is said to have found its way into America through the Spaniards about 1570. At this time it was played in England, France, Germany, and other countries, but the size of the table and style of the game differed. The English style of table and game was first adopted by the Americans. Six by twelve, six-pocket tables and four balls (two reds and two whites) were used. Soon the tables were reduced in size from 6x12 to 5½x11, then to about 5 feet wide by 10 feet long. Tables vary in measurements. All match and tournament games are now played on 5x10 tables, and are very popular in all leading public rooms and clubs throughout the United States, while the so-called 4½x9 tables are almost exclusively used in private residences and in small cities and towns.

It is only in the last 50 years that billiard tables and their paraphernalia, and billiard playing itself, have made giant strides. Until the year 1855, when Michael Phelan, the father of billiards, first introduced the celebrated combination cushions, made of rubber chiefly, the tools were necessarily crude and imperfect, and greatly retarded the progress of the players up to that period. Then was played the four-ball

game on a 6x12, six-pocket table. Two red balls and two white balls were used. In the 'sixties the tables were reduced in size to 5½x11, but so fast did the professionals and amateurs improve their games under the improved condition of the table and tools, and in order to avoid the seeming monotony of long runs, it was found necessary to again reduce the size of the table, from pockets to carrom, to about 5 feet wide and 10 feet long, and change the style of game from four-ball to three-ball game. This was done early in the 'seventies. Experts soon became so proficient at this style of game as to render it necessary to place restrictions on the bed of the table by drawing lines first 8 inches, then 10, 12, 14, and finally 18 inches from the edge of the cushions the entire length and width of the table—called balk-line game. This method of restricting the professionals and leading amateurs in no wise does away with the beauties of the game, as the Massé, draw, follow, and combination cushion shots are left intact. The superb play of the professionals in this country and in France, where the same style of game is played, is due in a great measure to the improved construction of the beveled table, slabs, match rubber cushions, and to the ivory balls, cue, cue tips, and chalk.

Various are the styles of billiards played now, such as "three-cushion carroms," "cushion carroms," "champions' game," "balk-line game," and the regular three-ball game.

Pool may be said to be, broadly speaking, a branch of billiards, and is very popular with the masses. It lacks the skill and variety of billiards. Pool is played on a 5x10 or 4½x9, six-pocket table, and generally with gully attachments—a new device that rather adds to the popularity of the game. This gully is so placed under the table that all balls, when pocketed will drop into a basket at the foot of the table. The most popular of the various pool games is "continuous pool," played with 15 numbered balls and one plain white one—the cue ball. These 15 balls are arranged in a triangle form at the foot of the table. The player's object is to drive as many of the numbered balls successively into one or other of the pockets as he can, subject to certain rules and regulations. There are various other kinds of pool games—"American," "pyramid," "Chicago," "forty-one," and others. For a complete list of these various styles of games, also all styles of billiards, with the rules governing them, the reader is referred to the 'Handbook of Standard Rules of Billiards and Pool.' This handbook also gives valuable hints on the care of tables, balls, cues, etc.

One of the most important parts that go to make billiard playing complete is the cue and cue-tip. The size and weight of the cue is a matter of individual judgment, but nearly all professionals and the best amateurs prefer one that weighs from 19 to 22 ounces, with the tip of the cue about a half inch full in diameter. The cue-tip is one of the leading, if not the leading, factor in billiard playing. Many public and private games are lost because of the imperfect quality of the cue-tip, and many players are wont to ascribe their defeat or bad play to the tip itself. Much depends on the manner of tipping the cue. Cue-tips are made in France and are of comparatively recent origin. They consist of two qualities of leather united, the under leather being very hard and flat, while

the upper or top leather is somewhat porous, spongy, and springy. Selecting a good leather and the tipping of billiard cues is an art in itself, and has become so important an adjunct to the success of the business that the leading billiard halls in this country find it necessary to employ a man to exclusively attend to that branch of the trade. It is an art, for instance, to hammer a tip down to the requisite firmness before it is ready to be glued to the top of the cue, over which the tip generally projects (if a new one), on all sides. Inside of an hour's time in dry weather, if the quality of the glue is good, the tip may be finished off ready for use. Turn the cue bottom side up, firmly press the leather onto a table, then using a sharp knife, cut the leather even with the top of the cue itself, and pare the upper leather as one would an apple, finish with sandpaper, size about $1\frac{1}{2}$, and smooth off with single O sandpaper. A cue-tip, when ready for playing, should be about half-moon shape, but many and various are the shapes of tips. Never use sandpaper on a cue-tip after it has been played with for a while. If the tip becomes hard or greasy from frequent use of chalk, roll it lightly with a French file.

Billiards is without doubt far superior in point of skill and science to any game played, either in-doors or out-doors. Chess and checkers are purely mental and yield no exercise to the body. Golf and other out-of-door games are dependent chiefly on execution, whereas billiard playing requires and combines both knowledge and execution. As a health-giving exercise and recreation, restful to the mind, physicians are now agreed that billiards leads all other games, while divines, politicians, artists, men of letters, and women, recommend it and play it at home, in the clubs and public rooms. It is steadily gaining in popularity among merchants, bankers, and brokers, as a relief to the turmoil of a busy life. No residence is thought complete without its billiard table, and the question is often asked "Which shall we have first, the piano or the billiard table?" and the answer is—"the billiard table first." GEO. F. SLOSSON,

American Billiard Expert.

Billings, Frank, American physician. He graduated M.D. at Chicago Medical College, 1881; was interne at Cook County Hospital, 1881-2; studied in Vienna, 1885-6; professor of medicine at Northwestern University Medical School, 1891-8; professor of medicine and dean of Rush Medical College, 1898.

Billings, John Shaw, American surgeon and librarian: b. Switzerland County, Ind., 12 April 1839. He was graduated at Miami University in 1857, and at the Ohio Medical College, 1860; was demonstrator of anatomy in the last institution, 1860-1; entered the Union army as an assistant surgeon, 1861; was promoted to lieutenant-colonel and deputy surgeon-general, 6 June 1894; and was retired, 1 Oct. 1895. He was professor of hygiene in the University of Pennsylvania, 1893-6; and in the last year was appointed director of the New York Public Library (Astor, Lenox, and Tilden Foundations). After the close of the war Dr. Billings took charge of the library in the surgeon-general's office; reorganized the United States Marine Hospital Service; was vice-president of the National Board of Health, 1879-82; and had

charge of the compilation of vital and social statistics in the Eleventh Census. He is a member of a large number of American and foreign scientific societies, and his numerous publications include: 'Principles of Ventilation and Heating'; 'Index Catalogue of the Library of the Surgeon-General's Office, United States Army'; 'National Medical Dictionary.'

Billings, Josh. See SHAW, HENRY W.

Billings, William, American composer: b. Boston, 7 Oct. 1746; d. there, 26 Sept. 1800. He was by trade a tanner, and his opportunities of instruction in any branch of knowledge, and particularly in the theory and practice of music, were few. A love of music and considerable vocal skill, however, led him, while still young, to become a teacher of singing and a composer of psalm-tunes, which eventually found their way into every church choir of New England and became great favorites with the people. He published no less than six collections of tunes, which, with a few exceptions, were of his own composition. They were founded upon the new style of church music, then first introduced by Tansur, A. Williams, J. Arnold, and other English composers, and their contrast to the dismal old tunes previously in use naturally gave them immense popularity, and in fact caused a revolution in musical taste in New England. They were far from being perfect in the requisites of good melody and harmony, and their author, in a quaintly worded preface to his second work, entitled 'The Singing Master's Assistant' and commonly known as 'Billings's Best,' apologizes for the errors which his first collection contains; but the melodies were generally good, and, had the composer enjoyed the advantages for musical instruction which the present age affords, his compositions would doubtless have possessed a permanent value. Billings was a firm patriot, and an intimate friend of Samuel Adams, who frequently sat with him at church in the singing-choir. Many of his tunes, composed during the war of independence, breathe the true spirit of patriotism, and were sung and played wherever New England troops were stationed. Billings may fairly claim the title of the first American composer, for before his time there is no record of any musical composition by a native of this country. He is also known as "the father of New England psalmody."

Billingsgate, a word said to have been derived from Belinus Magnus, a somewhat mythic British prince, father of King Lud, about 400 B.C. More probably it came from some unknown person called Billing. It is applied to the celebrated London fish market existent at least as early as 979 A.D., made a free market in 1699, extended in 1849, rebuilt in 1852, and finally exposed to the rivalry of another market built 1874-6. The word is also used to indicate foul, abusive language, such as is popularly supposed to be employed by fish-wives who are unable to come to an amicable understanding as to the proper price of the fish about which they are negotiating. Billingsgate is used as a synonym of coarse, vulgar abuse.

Billington, Elizabeth, English singer: b. London, 1768; d. Venice, 1818. Her father was a German oboe-player, her mother an English singer. She made her appearance as a singer at the age of 14, and at 16 married Mr. Billington, a double-bass player. She made her debut as

BILLION — BIMETALLISM

an operatic singer in Dublin, and afterward appeared at Covent Garden, where she secured an engagement for the remainder of the season of 1786 for \$5,000, the manager giving her two benefits. She visited France and Italy, and Bianchi composed the opera of 'Inez de Castro' expressly for her performance at Naples.

Billion, in Great Britain and Germany, the term used to denote a million millions. In France, America, and elsewhere it denotes a thousand millions. A similar difference is found in the use of the terms trillion, quadrillion, etc.

Billiton, East Indies, an island belonging to Holland, lying between Banca and the southwest of Borneo, of an irregular sub-quadrangular form, about 40 miles across; area, 1,863 square miles. Pop. about 41,900.

Billon, an alloy of copper and silver, in which the former predominates, formerly used in Austria and Germany for coins of low value, the object being to avoid the bulkiness of pure copper coin.

Billroth, Theodor, German surgeon: b. Bergen, on the island of Rügen, 26 April 1829; d. 6 Feb. 1894. He was educated at Griefswald, Göttingen, and Berlin; was professor of surgery at the University of Zurich in 1860, and at Vienna in 1867; in the war of 1870-1, he worked in German hospitals on the Rhine. He was one of the foremost surgeons of the day, not only as an operator, but as an authority on microscopic work, pathology, and military surgery.

Billy-boy, a flat-bottomed, bluff-bowed vessel rigged as a sloop, with a mast that can be lowered so as to admit of passing under bridges. They generally belong to the Humber ports.

Bilney, Thomas, "LITTLE BILNEY": b. probably at Norwich, about 1495; d. Norwich, 19 Aug. 1531. He studied at Trinity Hall, Cambridge, and was ordained in 1519. He was opposed to the formal "good works" of the Schoolmen, and denounced saint- and relic-worship; and to these plain Protestant views he converted Hugh Latimer and other young Cambridge men. In 1527 he was arraigned before Wolsey, and on recanting absolved, but was confined in the Tower for over a year. Stung by remorse, after two years of suffering, he began to preach in the fields of Norfolk, but was soon apprehended and condemned; and although reconciled once more to the Church, he had to suffer the penalty of heresy, and was burned to death.

Biloxi, bil-oks'i, Miss., a city in Harrison County, on Biloxi Bay, opening into the Gulf of Mexico, and the Louisville & N. R. R.; 80 miles northeast of New Orleans. It is principally engaged in the canning of oysters, fish, fruit, and vegetables, and has also considerable manufacturing and shipping interests. Biloxi is the site of the first settlement made upon the Mississippi by white men, under the direction of Pierre Le Moyne d'Iberville, in 1699. Pop. (1910) 7,988.

Biloxi Indians, one of the 10 groups of tribes into which the Siouan stock of North American Indians is divided. In 1669 they had one village on Biloxi Bay near the Gulf of Mexico. Thirty years later there were three villages, Biloxi, Paskagula, and Mactobi. A few survi-

vors of the tribe are still to be found near Lecompte, Rapides Parish, La.

Bilson, Thomas, English divine: b. Winchester, 1547; d. 1616. He was educated at Winchester School, and after completing his studies at New College, Oxford, became successively head master of the school and canon of the cathedral of Winchester. In 1585 he published a work, entitled 'The True Difference Between Christian Submission and Anti-Christian Rebellion,' intended mainly to defend the government and policy of Elizabeth; and in 1593 another work, entitled 'The Perpetual Government of Christ's Church,' still considered one of the ablest defenses of episcopacy. In 1596 he was made bishop of Worcester, and was transferred in the following year to Winchester. In 1603 Bilson preached the coronation sermon before James I., and in 1604 he took a prominent part in the celebrated conference at Hampton Court. The translation of the Bible, executed during the reign of James, was partly submitted to his revision. He was buried in the south side of Westminster Abbey.

Bilsted. See LIQUIDAMBAR.

Bilston, England, a town in Staffordshire, three miles southeast from Wolverhampton. Pop. about 24,000.

Bimetallism. Gold and silver have been used as money for thousands of years, both the Old Testament and profane history making frequent reference to such use of the precious metals. See NUMISMATICS.

As time went on the metals were coined into convenient pieces, and the weight and fineness of the coins guaranteed by the government. Finally, a legal ratio between the metals was fixed and the coins made a tender in payment of debts.

The term bimetalism is employed to describe a financial system wherein gold and silver are used as standard money and coined without limit at a fixed ratio. Bimetallism proper implies, first, that the money unit shall rest upon two metals; second, that these metals shall enjoy equal and unlimited coinage privileges; third, that they shall be connected by a fixed and definite legal ratio; and fourth, that the coins made from them shall be a full legal tender.

The term "limping bimetalism" has been applied to systems wherein gold and silver were used as standard money, but in which one of the metals was not coined at all, or not coined on equal terms with the other. The term, free coinage, has sometimes been used to mean unlimited coinage and sometimes to mean gratuitous coinage. Unlimited coinage is necessary to a complete bimetallic system. When coinage is limited the volume of standard money is regulated by law; when coinage is unlimited the volume depends, first, upon the total accumulation of coin, and, second, upon the annual production of the money metals. This sum is further augmented by the coinage of gold and silver plate when money becomes scarce, or lessened by an increased demand for gold and silver in the arts when money becomes plentiful.

Gratuitous coinage is not necessary to bimetalism, although it usually accompanies it. A charge can be made for mintage without destroying the bimetallic character of the system, but such a charge necessarily creates a differ-

BIMETALLISM

ence between the coinage and the bullion value of the metal. When coinage is gratuitous melted coin can be recoined without loss; when there is a mint charge melted coin loses an amount equal to the cost of coinage. The "melting pot test" is, therefore, not a test of honest money.

Bimetallism does not rest upon any particular ratio; the coinage ratio is fixed by law, and can be changed by law. The ratio simply states the proportion existing between the silver dollar and the gold dollar when measured by weight—that is, at the ratio of 16 to 1, the silver dollar weighs 16 times as much as the gold dollar. While the legal and commercial ratios between the metals have fluctuated from time to time the legal ratio has, as a rule, caused the change in the commercial ratio, and from the beginning of history down to 1873 the fluctuations in the commercial ratio were never as sudden or as great as they have been since 1873. During the 400 years which elapsed between 1473 and 1873 the extreme variation in the commercial ratio was from 14 to 1 to 16 to 1, although during that period there were greater changes in the relative production of the metals than have occurred since. For instance, between 1800 and 1840 the world's production of silver was about 4 to 1 in value, compared with the production of gold; after the new discoveries of gold in 1849 the production of that metal so increased that the annual output of gold was soon more than 3 to 1 in value, compared with the output of silver, and yet during this tremendous change in relative production the commercial ratio was comparatively stable, owing to the fact that all the gold and all the silver could go through the mints into the world's currency. Hostile legislation has driven the metals widely apart since 1873 and it is the contention of bimetallists that friendly legislation will bring the metals together.

The ratio of 16 to 1 is the one advocated by American bimetallists, first, because it was the ratio existing when the crusade against silver began; second, because it is the ratio now existing between the silver and gold coins in circulation in the United States; and, third, because an increase in the ratio, made by increasing the size of the silver dollar, would to the extent that it was joined in by other nations require the recoinage of silver coins into larger coins, and thus reduce the world's volume of standard money. If, for instance, the ratio were changed to 32 to 1 by international agreement, and the silver money of the world, approximating \$4,000,000,000,000, were recoined into \$2,000,000,000, it would cause a shrinkage of about 25 per cent in the total volume of metallic money and, as contracts would still call for the same number of dollars, such a change in the ratio would transfer billions of dollars in value from the wealth producers to the holders of fixed investments.

It will be noticed that bimetallism relates to the legal status of the metals rather than to their commercial value, and does not necessarily imply the simultaneous or concurrent circulation of both metals, although American bimetallists contend that the restoration of free coinage at the ratio of 16 to 1 would result in the concurrent circulation of both metals in this country. When the ratio was 15 to 1 in this country gold went to a premium of about 3 per cent because the French ratio was 15½ to 1;

when our ratio was changed to 16 to 1, silver, being undervalued at our mint as compared with its value at the French mint, rose to a premium of about 3 per cent.

The Gresham law has often been quoted against bimetallism. That law is merely a statement, made by a master of the English mint of that name, who announced as his observation that the bad coins ran the good coins out of the country—the explanation being that while, to a majority of the people, one coin was as good as another so long as it would pass current, the jewelers would melt and the dealers in money would collect and export the heaviest coins (coins passing by weight rather than by legal tender outside of their own country). It can readily be seen that the Gresham law was not intended to apply to the use of two metals, and that it can apply to the use of two metals only when there is difference between government ratios. When, for instance, we had a ratio of 15 to 1 in this country, and the French ratio was 15½ to 1, there was a tendency to send American gold to France and bring French silver to the United States, and yet this tendency did not cause the exportation of all American gold to France or of all French silver to the United States. France, being at that time the stronger nation commercially, fixed the ratio and our gold rose to a premium. In the payment of debts silver was the money employed, and gold, when it was used, was used at its commodity price. After 1834 the situation was reversed and silver went to a premium. Gold was then used for the payment of debts and for general transactions, and silver, when it was used, brought a premium. It is not fair to say, however, that gold went out of circulation entirely during the former period or that silver went out of circulation entirely during the latter period, for a great deal of the undervalued coin remained here and served the purpose of money, and to that extent relieved the pressure upon other kinds of money. That which left our country in exchange for another kind of metal did not reduce our circulation, and the exported coin still remained a part of the circulation of the world and helped to fix international prices.

In bimetallism the debtor always has the option. This is true, not because of a desire on the part of the government to favor the debtor, but because the parity can be maintained in no other way. If the debtor has the option the desire of all debtors to secure that metal which is the cheaper, will in itself, by increasing the demand for the cheaper metal and decreasing the demand for the dearer metal, tend to make the commercial value of the metals identical with the legal value, whereas, through the operation of the same selfishness, the metals would be driven apart if the creditor had the option, because the demand of the creditors for the dearer metal would still further increase its price, while the lessened demand for the cheaper metal would still further decrease its price.

The arguments in defense of the bimetallic system begin with the self-evident truth that stability in purchasing power is the test of virtue or honesty in money—that dollar being the best dollar which changes least from year to year in its command over all articles of merchandise. Stability would not be so important if all transactions were on a cash basis, but with

the increase in credits, especially long time credits, it is a matter of vital importance to have the purchasing power of the dollar fluctuate as little as possible. Jacobs, in his work on the precious metals, shows that an increase of 2 per cent a year in the purchasing power of the dollar would amount to an increase of 500 per cent in 100 years. It will be seen, therefore, that the burden of national debts and other long-time securities may be materially increased or decreased by a change in the purchasing power of the dollar.

That the value or purchasing power of the dollar depends upon the number of dollars has been declared to be, and correctly so, the most fundamental principal in the science of money. To illustrate: if the business of the world is adjusted to a certain volume of money, and that volume of money is afterward suddenly doubled, prices will necessarily rise, because there will be more money with which to purchase other things. If, on the other hand, the volume of money is suddenly reduced one half prices will fall because of the scarcity of money. Next to absolute stability in the purchasing power of the dollar or unit, the most desirable thing is that any necessary change in the purchasing power of the dollar shall be gradual rather than sudden, and a sudden change in the value of the dollar can only be prevented by the prevention of a sudden change in the volume of money. When it is remembered that the money changer and the owner of fixed investments profit by a rising dollar it is easy to understand why they have always led the movements in favor of scarce money.

Dr. Sturtevant in his book, entitled 'Economics, or the Science of Wealth,' illustrates the gradual change in the volume of metallic money as follows:

"Gold and silver, considered as a standard value, are an ocean flowing around the whole economic world, and very large additions at two or three points are immediately distributed to every part."

The quantity of metallic money is so great that the annual addition to it is small in comparison.

Bimetallism is theoretically better than monometallism (either of gold or silver), because under the double or bimetallic standard the volume of money changes less rapidly and less suddenly than under the single standard. Thus far history has shown no instance of a large simultaneous increase in the production of both gold and silver. There was an enormous increase in the production of silver during the 16th century; then there was a great increase in the production of gold during the year 1849 and the years immediately following. Early in the 'seventies there was another increase in the production of silver and we are just now enjoying a considerable increase in the production of gold. In each instance the increase in the production of one metal has spread itself over the entire volume of money and has, therefore, caused a less proportionate increase than it would have caused had the world been using but one metal, either gold or silver, as standard money.

The superior stability of the bimetallic system over the monometallic system has been shown by many illustrations, the most familiar being that which likens the volume of money to

a body of water receiving the inflow from two rivers instead of one.

The practical argument in favor of bimetallicism is that neither metal alone furnishes a sufficient quantity of money to support the world's commerce. Bimetallism is, therefore, actually necessary as well as theoretically advantageous. This phase of the question was not much considered until after 1873 because, prior to that date, there were sufficient mints open to the coinage of both metals to furnish a monetary use for every ounce produced. When all of the gold and silver available for coinage could go through the mints into the currency, each nation could consider the question from a purely theoretical standpoint, because so long as the commercial world had the benefit of the entire volume of gold and silver, it did not make so much difference how many nations used one metal, or the other, or both. When, however, the crusade against silver began and enough nations joined in it to reduce the demand for silver below the supply available for coinage, then each nation was compelled to consider not only its preference as to a standard, but whether—and it was a vital question—it was always sure of having a sufficient quantity of the chosen metal.

The advocates of bimetallicism not only contend that the law of supply and demand regulates the value of the dollar—an increase in the demand, the supply remaining the same, raising the purchasing power of the dollar, and an increase in the supply, the demand remaining the same, decreasing the purchasing power of the dollar, but they also believe that supply and demand regulate the market price of the metals.

The contention of monometallists that it is impossible to fix a relation between two metals is met with the reply that the relation between two things of limited production, such as gold and silver, can be fixed by any nation or group of nations which can furnish a use for so much of both metals as is available for coinage. Gold and silver differ from agricultural products in that they must be found before they can be produced. If gold and silver could be raised from seed and cultivated practically without limit, as, for instance, corn and wheat can be, it would be very difficult if not impossible to fix a relation between them, but they are called precious metals because they are scarce.

The demand created by the government must be considered as added to the demand created by the arts. If the demand created by the government is sufficient to utilize the surplus over and above what the arts require, the commercial value can be kept up to the coinage value for the reason that each owner will seek the highest possible price, and so long as the government stands ready to convert a given amount of metal into a given amount of money, he will not have to dispose of the metal to any one else for less than the government price. If the government, instead of standing ready to convert one metal into money, stands ready to convert two metals into money, it can make the commercial ratio and the coinage ratio identical, if there is a use for the money. The changes in relative production would not affect this condition so long as the government was able to utilize all of the surplus of both metals.

The influence exerted by the legal ratio on the commercial ratio is well described by the

BIMETALLISM

Royal Commission of England, which in its report of 1888 said: "Nor does it appear to us *a priori* unreasonable to suppose that the existence in the Latin Union of a bimetallic system with a ratio of $15\frac{1}{2}$ to 1 fixed between the two metals, should have been capable of keeping the market price of silver steady at approximately that rate. The view that it could only affect the market price to the extent to which there was a demand for it for currency purposes in the Latin Union, or to which it was actually taken to the mints of those countries is, we think, fallacious. The fact that the owner of silver could, in the last resort, take it to those mints and have it converted into coin which would purchase commodities, at the ratio of $15\frac{1}{2}$ of silver to 1 of gold, would, in our opinion, be likely to affect the price of silver in the market generally, whoever the purchaser and for whatever country it was destined. It would enable the holder of the silver to stand out for a price approximating to the legal ratio and would tend to keep the market steady at about that point."

Independent bimetallicists and international bimetallicists agree as to the theoretical and practical benefits of the double standard, but differ as to the ability of the United States to maintain the parity alone, the former believing, and the latter denying, that under conditions as they now exist our nation is able to utilize all the silver that could come to our mint.

If our government offered to coin into money at a fixed ratio every ounce of gold and silver presented at the mint, the supply brought to the mint would necessarily come from one of three sources—that is, from silver bullion already in existence, from silver coin of other countries, or from the annual product of the mines.

As there is no considerable quantity of silver held in the form of bullion, there could be no material increase in our coinage from that source.

Whether silver coin would come to our mint from other countries would depend entirely upon the ratio. The fear that, under bimetallicism, our country would be flooded with the coined silver of the world, is entirely without foundation, for the reason that our ratio, 16 to 1, is more favorable to gold than the ratio existing between gold and silver in the nations that have a large quantity of silver coin. France, for instance, is the largest European holder of silver, but as her silver now circulates on a parity with gold at a ratio of $15\frac{1}{2}$ to 1, it could only come here at a loss equivalent to about three cents on the dollar.

Whether the mines would furnish an excessive amount of silver is a question about which no one could speak positively, because no one can foresee new discoveries or estimate the possible exhaustion of mines now being worked. There is, however, nothing in the past to justify a fear of over-production.

Raising the government price of a precious metal does not necessarily increase the production of it, neither does the lowering of the price necessarily reduce the production. For instance, the law of 1834 reduced the government price of gold, and yet soon afterward there was a wonderful increase in the production of gold. The discoveries of silver following 1870 were not brought about by an in-

crease in the price of silver, and for several years the production of silver increased, even with a falling market. The monetary use of gold and silver is the controlling use. If, by agreement among all the nations, the legal tender function was withdrawn from both gold and silver, and other money substituted for them, both would fall in value, just how much no one knows, because a fall in the price of either of the metals would develop new uses and thus increase the demand, which, in its turn, would act with the supply in determining the ultimate price. While it is probable that a higher price for silver bullion would cause the re-opening of some mines which have been abandoned because of the low price of silver, the production of silver would not be likely to be increased to any such extent as has been imagined.

It is not out of place to refer, in this connection, to another matter which has been the subject of much speculation, namely, the cost of producing gold and silver. The labor cost has less influence on the price of gold and silver than upon products of the soil. In the case of agricultural products, an attempt to raise the price of any kind of crop much above the cost of production would immediately be followed by such an increase in the crop as to at once cause a supply that would reduce the price. If, on the other hand, the cost of producing a particular kind of crop is increased out of proportion to the price, the production will fall off until the scarcity of the article raises the price. In the case of the precious metals, however, the supply cannot be increased at will, and therefore the price does not necessarily vary with the cost of production. If, for illustration, all the gold mines were to be exhausted excepting one, and this one mine began producing just the amount that all the mines now produce, but no more, the price of gold would remain the same whether it was produced at \$1.00 an ounce or at 1 cent an ounce.

We have no means of ascertaining the labor cost of either gold or silver. About 10 years ago the director of the mint was asked for statistics in regard to the labor cost of producing gold and silver, and his reply was that there were no statistics in regard to gold and none of any value in regard to silver, because the statistics were gathered from the mines in operation and did not include the money expended in prospecting and in mines that had ceased to produce. No two mines in the world have produced either gold or silver at the same cost for any considerable period. If we take into account the money spent in prospecting and the money spent in the purchase of claims that have proven worthless, as well as the money invested in machinery and other appliances, it is probable that more than \$1.00 has been expended for every dollar of either gold or silver taken out of the earth, and it is also probable that, dollar for dollar, it has cost less to produce gold than silver; first, because gold is often found in nuggets, while silver is found in veins, and second, because gold is often found on the surface, while silver is, as a rule, a deep-mine product.

Space does not permit a history of the conflict between the standards in Europe. England has maintained the gold standard for about a century and has exerted a controlling influence

BIMETALLISM

on several other European nations. During this period France, although free coinage is now suspended, has been the most loyal supporter of bimetallism and as late as 1897 offered to join the United States in the restoration of coinage, provided England and Germany would do likewise.

After the gold discoveries of 1849, the European financiers became alarmed lest the increased production of the yellow metal would largely aid debtors, and there was quite a sentiment in favor of the demonitization of gold. Writers like Chevalier were complaining that holders of fixed investments were in danger of suffering from a cheap gold dollar. It was exactly the same argument that was made against the white metal a little later when the Comstock lode and other rich deposits of silver were discovered.

Bimetallism in the United States.—The bimetallic standard was recommended by Jefferson and Hamilton, and adopted by our government by a statute approved by George Washington 2 April 1792. This law provided for the free and unlimited coinage of silver and gold at the ratio of 15 to 1, the coins being equally a legal tender for all debts public and private. The Spanish milled dollar then in use in this country contained the same amount of pure silver as our present silver dollar and, the ratio of 15 to 1 having been adopted, the gold dollar was made to weigh one fifteenth as much. The silver dollars then coined (many of which are now in existence), are sometimes called the "unit dollars," because they have on the edge the following inscription: "Hundred Cents, One Dollar, or Unit."

In 1834 (28 June) the ratio was changed from 15 to 1 to 15.988 to 1, which for convenience has been called 16 to 1. The change was made for the purpose of checking the exportation of gold, but as the new ratio undervalued silver it made gold the money in general use. This law, supported by Thomas H. Benton, and approved by Andrew Jackson, provided for the free and unlimited coinage of gold and silver into full legal tender money at the new ratio. In 1837 (28 January) the alloy in the dollar, both gold and silver, was changed from one twelfth to one tenth, making the weight of the standard silver dollar $412\frac{1}{2}$ grains, nine tenths fine, and the weight of the standard gold dollar 258.10 grains, nine tenths fine.

As the law of 1834 undervalued silver and led to the exportation of considerable quantities of it, it became difficult to keep fractional currency in circulation, and to remedy this the law of 1853 was enacted. By the terms of this law subsidiary silver (that is, coins of less denomination than \$1.00), were reduced from full weight to light weight and made token money, with limited legal tender, instead of standard money. This law, however, did not change the provision in regard to the standard silver dollar, the free and unlimited coinage of that dollar still continuing. The subsidiary silver coins were redeemable in the standard money, either gold or silver. Sometimes the Act of 1834 has been referred to as establishing the gold standard, but this is erroneous. It merely changed the ratio and that, too, by reducing the weight of the dearer dollar, not by increasing the weight of the cheaper dollar. Equally erroneous is the assertion that the Act of 1853 established the

gold standard. That did not in the least change the law relating to the standard money, either gold or silver.

On 12 July 1873 the demonitization of silver was effected by an act entitled "An Act Revising and Amending the Laws Relative to the Mints, Assay Offices, and Coinage of the United States." (A similar law having the same purpose had just before been enacted in England, and a copy of it delivered to the director of our mint.)

When this law was passed the business of the country was being transacted with paper money, both gold and silver being at a premium—silver at a greater premium than gold. No attention was being paid to the subject of metallic money and the purpose of the law of 1873 was not generally understood. In making provision for silver coinage it omitted the coinage of the standard silver dollar, and substituted for it a trade dollar of 420 grains which was intended for use in the Orient, it being thought that the trade dollar would compete with the Mexican dollar in China and other Eastern countries. In 1874 (20 January) the Federal statutes were revised, and in this revision a clause was inserted limiting the legal tender of silver coins to \$5.00. Neither the Act of 1873 nor the Act of 1874 was generally discussed, and it is only the recognition of a well-settled fact of history to say that this discrimination against silver and in favor of gold was not known among the people and not thoroughly discussed even in Congress. When the matter became known an active agitation for the restoration of silver at once began, and nearly all of those who voted for the measure denied that they knew that the Act of 1873 was intended to demonitize silver.

The suspension of silver coinage by the United States alone would not have caused a fall in the price of silver as measured with gold, but other nations joining in the demonitization of silver it soon became apparent that the mints still open could not utilize all the silver available for coinage, and the gold price of silver began to decline. The effort to reopen the mints to silver resulted in the passage of what was known as the Bland-Allison Act. The bill, as it passed the House, under the leadership of Richard P. Bland, of Missouri, restored the free and unlimited coinage of gold and silver at the ratio of 16 to 1. The opposition in the Senate was sufficient, however, to defeat the bill in its original form, and to compel the acceptance of a substitute framed by Senator Allison, whose name was thus connected with the law. This compromise measure provided that there should be "coined at the several mints of the United States silver dollars of the weight of $412\frac{1}{2}$ grains troy of standard silver as provided by the Act of January 1837," and also provided that such silver dollars "together with all silver dollars heretofore coined by the United States of like weight and fineness" should be "a legal tender at their nominal value for all debts and dues public and private, except where otherwise expressly stipulated in the contract."

It will be seen that this law restored the coinage of silver dollars under the law of 1837, but did not contain the former provision in regard to the unlimited coinage of silver on private account as gold was then and is now coined. In order to secure the bullion out of

BIMETALLISM

which to coin the dollars mentioned in the Act of 1878, the law provided "that the secretary of the treasury is authorized and directed to purchase, from time to time, silver bullion, at the market price thereof, not less than \$2,000,000 worth per month, nor more than \$4,000,000 worth, and cause the same to be coined monthly, as fast as so purchased, into such dollars."

In carrying out the provisions of the law, the Treasury Department purchased the minimum required rather than the maximum permitted.

It will be seen, also, that while the silver dollar was restored to general legal tender, a provision was inserted that permitted the exclusion of the dollar by private contract—that is, private individuals were permitted to discriminate against silver, although they were not permitted to discriminate against gold. The purchase of silver for coinage under this act retarded the fall in the price of silver, but as it did not consume the entire surplus it was not sufficient to restore the price of bullion to the coinage price of \$1.29 an ounce.

The Bland-Allison Act remained on the statute books until 1890, when it was repealed by what was known as the Sherman Purchase Act, which provided for the purchase of 4,500,000 ounces of silver per month, or so much thereof as might be offered at a price not exceeding the coinage value, the bullion to be paid for by the issue of treasury notes, redeemable in coin, and after the first of July 1891 only so much of the silver was to be coined as was necessary to redeem the treasury notes presented.

This act immediately increased the demand for silver and raised the price of silver bullion, not only in the United States, but all over the world, to about \$1.21 an ounce. But when it was found that even this demand was not sufficient to utilize all the surplus silver, the price again began to fall.

Secretary Rusk, in the Agricultural Report of 1890, called attention to the fact that the Sherman Purchase Law raised the price of silver and declared that that rise in price "unquestionably had much to do with the recent advance in the price of cereals," and added, "the same cause has advanced the price of wheat in Russia and India, and in the same degree reduced their power of competition. English gold was formerly exchanged for cheap silver, and wheat purchased with the cheap silver metal was sold in Great Britain for gold. Much of this advantage is lost by the appreciation of silver in those countries."

The Sherman Act was also a compromise, urged by the opponents of silver to prevent the passage of a free coinage law. Mr. Sherman, in his 'Recollections,' published in 1895, thus speaks of the strength of the free silver movement, and of the purpose of the compromise:

"A large majority of the Senate favored free silver, and it was feared that the small majority against it in the other House might yield and agree to it. The silence of the President on the matter gave rise to an apprehension that if a free coinage bill should pass both Houses he would not feel at liberty to veto it. Some action had to be taken to prevent a return to free silver coinage, and the measure evolved was the best obtainable. I voted for it, but the day it became a law I was ready to

repeal it, if repeal could be had without substituting in its place absolute free coinage."

The treasury notes issued in the purchase of silver were made a legal tender for the payment of all debts public and private, except where excluded by contract, and were redeemable by the secretary of the treasury "in gold or silver coin at his discretion." It will be seen that the option as to the coin of payment was reserved to the government, but another clause in the measure which declared it to be "the established policy of the United States to maintain the two metals on a parity with each other upon the present legal ratio or such ratio as may be provided by the law," was afterward construed by the Treasury Department to deprive the secretary of the option. At any rate the department adopted the policy of paying in gold when gold was demanded, and although Secretary Carlisle afterward declared before one of the House committees that it would have been better for the government to have reserved the option, he, when he came into office, followed the precedent set by his predecessor.

This ruling of the Treasury Department was followed by the presentation of treasury notes and a demand for gold, and the drain upon gold which followed was used as an argument in favor of the repeal of the purchase clause of the law. The treasury note was declared to be an endless chain, although it only became an endless chain when the department surrendered the option which the law expressly conferred upon it. It may be added that the same endless chain argument has been made against the greenback, and can be made against the silver dollar if it is ever made specifically redeemable in gold.

What has sometimes been called "the silver movement" began with the discovery of the effect of the law of 1873, and has continued with varying force ever since. It was called the silver movement, not because of partiality to silver, but because silver was the metal discriminated against. It might better be designated as the bimetallic movement, because it was an effort to restore bimetallicism, and the supporters of the movement asked for silver nothing more than was already granted to gold. The movement did not originate in the mining States, but extended over the entire country and throughout other countries, the interest being centred in silver as a money rather than in silver as a metal.

During the period that has elapsed since 1873 three international conferences have been held with a view to the restoration of silver (at Paris in 1878 and in 1881, and at Brussels in 1892), but they have been unsuccessful, largely because other European countries have hesitated to act without England, and England, being largely a creditor nation, has been unwilling to surrender the advantage which a rising dollar has given her in the increased purchasing power of her credits.

In the summer of 1893, the President, giving as his reason the suspension of the coinage of silver in India, called Congress together in extraordinary session and recommended the unconditional repeal of the purchase clause of the Sherman Law. Congressman Wilson, chairman of the Committee of Ways and Means, and leader of the administration forces in the House, introduced a bill identical in purpose and almost

BIMETALLISM

identical in language with one introduced by Senator Sherman a year before. The object of this bill was to repeal the purchase clause of the Sherman Law without substituting any provision for the further coinage of silver. It was supported by all who were opposed to bimetalism, and by some who declared themselves in favor of bimetalism but criticised the purchase of silver on the ground that it was contrary to the theory of bimetalism. These insisted that as soon as the Sherman Law was repealed the remainder of the Democratic platform would be carried out and bimetallic coinage re-established. A few were induced to support the measure under the belief that the suspension of silver coinage here would force European nations to an agreement for the restoration of bimetalism throughout the world. After a prolonged contest this bill became a law 1. Nov. 1893. Following this an attempt was made to secure the coinage of the seigniorage which had accumulated in the treasury. This bill passed both Houses, receiving the support of many who voted for the repeal of the purchase clause of the Sherman Law, but this measure was vetoed by the President. The administration then attempted to secure the passage of a law authorizing the issue of gold bonds, but this was defeated in the House of Representatives.

As the Act of 1893 virtually opened the campaign of 1896, in which the silver question figured so prominently, it may be well to consider the platforms adopted just before and just after that date.

During the period extending from 1873 to 1896 the platforms of the two leading parties, while more or less ambiguous on the money question, recognized the advantages of the double standard. In 1884 the Republican platform declared in favor of an international conference to fix the relative value of gold and silver coin, while the Democratic platform declared in favor of "honest money, the gold and silver coinage of the Constitution, and a circulation medium convertible into such money without loss." In 1888 the Democratic party reaffirmed the platform of 1884, while the Republican party inserted the following plank in its platform: "The Republican party is in favor of the use of both gold and silver as money, and condemns the policy of the Democratic administration in its efforts to demonetize silver."

In 1892 the Republican platform said: "The American people from tradition and interest favor bimetalism, and the Republican party demands the use of both gold and silver as standard money," and then followed a clause demanding "that the purchasing and debt-paying power of the dollar, whether of silver, gold, or paper, shall be equal at all times."

The Democratic party that year denounced the Sherman Law (the Act of 1890) as a cowardly makeshift, and demanded its speedy repeal, and then declared the party's position as follows:

"We hold to the use of both gold and silver as the standard money of the country, and to the coinage of both gold and silver without discrimination against either metal or charge for mintage, but the dollar unit of coinage of both metals must be of equal intrinsic and exchange-

able value or be adjusted through international agreement, or by such safeguards of legislation as shall insure the maintenance of the parity of the two metals, and the equal power of every dollar at all times in the markets, and in the payments of debts; and we demand that all paper currency shall be kept at par with, and redeemable in, such coin. We insist upon this policy as especially necessary for the protection of the farmers and laboring classes, the first and most defenseless victims of unstable money and a fluctuating currency."

The Populist party, which polled about 1,000,000 votes that year, demanded "the free and unlimited coinage of silver and gold at the present legal ratio of 16 to 1." This was the first national platform which specifically named the ratio, but a majority of the Democrats in Congress and many Republicans had for years been voting for bills providing for free and unlimited coinage at this ratio.

In the campaign of 1896, the money question was the paramount issue. The Democratic platform, adopted at Chicago, demanded "the free and unlimited coinage of both silver and gold at the legal ratio of 16 to 1, without waiting for the aid or consent of any other nation." The People's party, which met two weeks later, adopted a plank substantially like it, as did also the Silver Republican party.

The Gold Democrats, who withdrew from the Chicago convention, met at Indianapolis and declared in favor of the gold standard.

The Republican party said: "We are unalterably opposed to every measure calculated to debase our currency or impair the credit of our country. We are therefore opposed to the free coinage of silver except by international agreement with the leading commercial nations of the world, which we pledge ourselves to promote, and until such agreement can be obtained, the existing gold standard must be preserved."

In March 1896 a resolution was adopted in the English Parliament pledging the government to assist in restoring the par of exchange between gold and silver, and this pledge encouraged many in this country to hope for an international agreement.

The campaign of 1896 resulted in the election of the Republican ticket by a large majority, but as that party had committed itself to international bimetalism, the verdict at the polls was a victory for the double standard rather than for the single gold standard.

In pursuance of the promise contained in the Republican platform, President McKinley, immediately upon taking his seat, sent a commission to Europe to solicit co-operation in the restoration of silver to its former place by the side of gold, but this commission failed to secure any concessions from England and no formal conference was arranged.

In 1900, the Democratic party, the People's party, and the Silver Republican party adhered to the positions taken on the money question in 1896, while the Republican platform said: "We renew our allegiance to the principle of the gold standard and declare our confidence in the wisdom of the legislation of the 56th Congress, by which the parity of our money and the standard of our currency on the gold basis has been secured."

The election in 1900 resulted in an increased electoral and popular majority for the Republican ticket, but other questions over-shadowed the money question in this campaign, and the result was again undecisive as to the standards.

The large and unexpected increase in the output of gold in Alaska, the United States, South Africa, and Australia has very considerably increased the supply of money, and to some extent relieved the strain which began with the demonetization of silver in 1873, but with the white metal still furnishing nearly one half of the world's basic money there is no reason to believe from past or present indications that silver can be dispensed with as a standard money. The gold standard cannot be accepted as a finality in any country until it is accepted as a finality throughout the world, for each nation's supply of metallic money is influenced by the demand created by each other nation. It is probable, therefore, that what is called the money question, will, in so far as it relates to metallic money, increase or decrease in importance in inverse ratio to the supply of money, occupying more attention when a decrease in the volume of money reduces prices and being less considered whenever an increase in the volume of money increases prices. See DEMOCRATIC PARTY; PEOPLE'S PARTY; REPUBLICAN PARTY; SILVER REPUBLICAN PARTY.

William McKinley and G. A. Hobart were the Republican candidates for President and Vice-President in 1896 and William Jennings Bryan and Arthur Sewall the Democratic candidates. The People's party nominated Mr. Bryan, but substituted Thomas A. Watson for Mr. Sewall for Vice-President. The Silver Republicans endorsed both Bryan and Sewall. The Gold Democrats nominated John M. Palmer and Simon B. Buckner. In 1900 William McKinley and Theodore Roosevelt represented the Republicans; and William Jennings Bryan and Adlai E. Stevenson represented the Democrats, Populists, and Silver Republicans.

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ence of Value'; Seyd (Ernest), 'Bullion and Foreign Exchanges'; Smith (Adam), 'Wealth of Nations'; Stokes (Anson Phelps), 'Joint Metallism'; Teller (James H.), 'Battle of the Standards'; Walker (Francis A.), 'International Bimetallism'; Walsh (Archbishop), 'Bimetallism'; Watson (David K.), 'History of American Coinage.' 'The First Battle' was issued by Mr. Bryan in 1897. It contained a brief history of the silver movement, an account of the campaign of 1896 and reproduces his principal speeches on bimetallism.

WILLIAM JENNINGS BRYAN,
Editor 'The Commoner.'

Bin, Jean Baptiste Philippe Emile, zhôn báp-têst fê-lêp â-mêl, French painter: b. Paris 10 Feb. 1825. He is a pupil of Gosse and Cogniet. In 1878 he was made a member of the Legion of Honor, and in 1881 was conspicuous as one of the founders of the Society of French Artists. Since that time he has taken an active part in politics and has been elected mayor of the 18th *arrondissement*. His 'Prometheus Chained' is in the Museum at Marseilles. Among his historic portraits are those of MM. Clemenceau, Rousseau, Deschamps, etc. He works principally in portraiture and decorative painting, in both of which lines he has been eminently successful.

Binalonan, Philippines, a town of the province of Pangasinán, Luzon, situated in the western part of the island of Luzon, about 20 miles from the coast, at the junction of several highroads. Pop. 10,295.

Binan, Philippines, a town of the province of Laguna, Luzon, situated on the Bay Luzon, about 15 miles south of Manila, on highroads connecting it with Cavite, Manila, and other important towns. Pop. 19,786.

Binary Arithmetic, a method of notation invented by Leibnitz, but which appears to have been in use in China about 4,000 years ago. As the term binary implies, there are only two characters in this notation; these are 1 and 0. By it, our 1 is noted by 1, our 2 by 10, 3 by 11, 4 by 100, 5 by 101, 6 by 110, 7 by 111, 8 by 1000, 9 by 1001, 10 by 1010, etc. The principle is that 0 multiplies by 2 in place of by 10, as on the common system. Some properties of numbers may be more simply presented on this plan than on the common one; but the number of places of figures required to express a sum of any magnitude is a fatal objection to its use. Indeed, Leibnitz himself did not recommend it for practical adoption.

Binary Logarithms, a system of logarithms devised by Euler for facilitating musical calculations. Instead of having, like the common system of logarithms, 1 as the logarithm of 10, and 43,429,448 as the modulus, it had 1 as the logarithm of 2, and the modulus 1,442,695.

Bi'nary Star. See DOUBLE STARS.

Binary Theory, in chemistry, a hypothesis proposed by Davy to reduce the haloid salts (as NaCl) and the oxygen salts (as NaNO₃) to the same type, the monad Cl' being replaced by the monad radical containing oxygen (NO₃)'. Acids are hydrogen salts, as HCl, or H(NO₃)'. A radical is only part of a molecule, which can unite with or replace an element or another radical, atomicity for atomicity. Thus the dyad radical (SO₂)" can replace two monad radicals,

BINBIR-KILISSEH — BINGHAMTON

(NO₃)₂ as in the equation Pb²⁺(NO₃)₂ + Mg²⁺(SO₄)²⁻ = Pb²⁺(SO₄)²⁻ + Mg²⁺(NO₃)₂. A radical cannot exist in a separate state.

Binbir-kilisseh, bēn'bēr-kē-lē-sā', some ruins of ancient tombs in the pashalic of Karamania, Asia Minor, 20 miles north-northwest of Karaman, supposed to occupy the site of Lystra, where the cripple was healed by Paul.

Bindraban, bīn-dra-būn', or **Brindaban**, India, a town in the Northwestern Provinces, in the district of Mattra, and 35 miles north-northwest of Agra, on the right bank of the Jumna. It is famous as the scene of the youthful sports of Krishna, who has still many temples here. Among these is a cruciform pagoda, which is one of the most massy and elaborate of Brahmanical buildings. Pop. 31,611.

Bindweed. See CONVOLULUS.

Binet, bē-nā, Alfred, French psychologist: b. Nice, 8 July 1857. At first he studied law and medicine at Paris, but in 1880 took up the study of psychology, both experimental and pathological, and was later appointed director of the laboratory of physiological psychology at the Sorbonne, Paris. He has been one of the editors of 'L'Année psychologique'; has contributed numerous articles to scientific and philosophical periodicals, including 'Mind'; and has written 'Animal Magnetism' (translated into English); 'Studies in Experimental Psychology' (one part of which, on micro-organisms, was translated separately); and 'Introduction to Experimental Psychology' (with Philippe and others).

Binet, Victor Jean Baptiste Barthelemy, zhōn bāp-tēst bār-tāl-mē, French landscape painter: b. Rouen, 17 March 1849. He belongs to the realistic school, and made his debut in the Salon of 1878, showing 'The Warren.' One of the most famous of his pictures is 'The Plain at St. Aubin-sur-Quillebœuf,' in the Museum at Amiens. In 1889 he was awarded a first-class medal at the Paris Exposition.

Bingen, Germany, a town of the grand-duchy of Hesse-Darmstadt, on the left bank of the Rhine and the right of the Nahe. Bingen existed in the time of the Romans, by whom it was called Vincum or Bingham. The bridge over the Nahe is said to have been built by Drusus, and bears his name. In the neighborhood are the remains of a castle, where the Emperor Henry IV. was detained a prisoner in 1105, and the Mäuse-thurm or Mouse-tower, in the middle of the river, the scene of the ancient legend of Archbishop Hatto, who was devoured by rats. A dangerous passage on the Rhine, called the Bingerloch, has been opened up by the blasting of sunken rocks, leaving a channel of 210 feet wide. Bingen is the market for the sale of wines produced in the neighborhood. Pop. about 10,000.

Binger, Louis Gustave, bān-zhā, loo-ē, goos-tāv, French soldier and African explorer: b. 14 Oct. 1856. He made his way from the Upper Niger to Grand Bassam in 1887-9, thus connecting the French possessions with the Ivory Coast. In 1892 he was commissioner of the French government to settle the Ashanti boundaries with England.

Bingham, Hiram, American Congregational clergyman: b. Bennington, Vt., 30 Oct. 1789; d. 11 Nov. 1869. He graduated from Andover Theological Seminary in 1819; and was one of the first missionaries of the Congregational Church to be sent to the Sandwich Islands, where he acquired much influence with the natives.

Bingham, Joel Foote, American clergyman: b. Andover, Conn., 11 Oct. 1827. He entered the Congregational ministry, but in 1871 exchanged it for that of the Episcopal Church. He has written 'The Christian Marriage Ceremony'; 'Francesca da Rimini' (1897-1904), and 'Sacred Hymns and Napoleonic Ode of Alexander Manzoni' (1904), translations.

Bingham, John A., American politician: b. Mercer, Pa., 1815; d. Cadiz, Ohio, 20 March 1900. He studied at Franklin College, Ohio, and became a lawyer in 1840. He was elected to Congress as a Republican in 1854, and retained his seat 1855-63. He was chairman of the managers of the House in the impeachment of Judge Humphreys, for high treason, in 1862. President Lincoln appointed him military judge-advocate in 1864, and later in the same year solicitor of the United States Court of Claims. He was special judge-advocate in the trial of the assassins of President Lincoln. He sat in Congress again 1866-73. He was one of the managers of the impeachment trial of President Johnson. From 1873 to 1885 he was United States minister to Japan.

Bingham, Joseph, English clergyman and antiquarian: b. Wakefield, Yorkshire, 1668; d. 17 Aug. 1723. He distinguished himself as a student at University College, Oxford, and devoted his attention particularly to ecclesiastical antiquities. He graduated in 1688, and became a Fellow the following year; but had to withdraw from the university on the charge of preaching unsound doctrines. He now became curate of Headbourn-Worthy, near Winchester, and there, while possessed of a scanty living on which his numerous family could barely subsist, had the merit of composing one of the most learned works of which his church can boast. This work, 'Origines Ecclesiasticæ, or The Antiquities of the Christian Church,' was published in 10 volumes octavo (1708-22), and is still a standard on the subjects of which it treats. The best modern edition is that published at the Clarendon Press (1855, 10 vols.). It was soon translated into Latin and published in Germany. In 1712 he was collated to the living of Havant, near Portsmouth, where he died.

Bingham, Kinsley S., American legislator: b. Camillus, N. Y., 16 Dec. 1801; d. Green Oak, Mich., 5 Oct. 1861. He studied law and went to Michigan in 1833. He was a judge of probate, speaker of the State House of Representatives; member of Congress 1849-51; governor of Michigan 1855-9, and U. S. senator 1859-61.

Binghamton, N. Y., a city and county-seat of Broome County, at the junction of the Chenango and Susquehanna rivers, and on several railroads; 50 miles east of Elmira. It stands more than 850 feet above tidewater, and both rivers are here spanned by several

bridges. The city is supplied with water by the Holly system, which cost over \$1,500,000; has nearly 100 miles of streets lighted by electricity, and contains over 30 churches, and chapels, public school property valued at over \$425,000, a public library, two national banks, and assessed property valuation (1910) exceeding \$25,000,000. Among the attractions of Binghamton, which has been named the "Parlor City," are Ross Park, Bennett Grove, and the driving parks and fair grounds. The noteworthy buildings include the State asylum for the insane, U. S. government building, State armory, new courthouse, city hall, two orphan asylums, the Commercial Travelers' Home, an opera house, and the Casino. Binghamton ranks as the third cigar-manufacturing city in the United States, and according to the census of 1890 it then had 704 manufacturing establishments, employing \$9,058,651 capital and 10,191 persons; paying \$4,349,162 for wages, and \$7,659,207 for material, and having a combined output valued at \$15,040,152. Other important manufactures are scales, chemicals, furniture, sheet-metal work, glass, gloves, and refined oils. An interesting feature of the city is the large number of cottages owned by the working people. Binghamton received a city charter in 1867. Pop. (1900) 39,047; (1910) 48,443.

Bingley, Ward, Dutch actor: b. Rotterdam, of English parents, 1755; d. The Hague, 1818. In 1799 he made his debut on the stage of Amsterdam, and almost from the first took his place at the head of his profession, not only in the Dutch theaters, but also in those which performed French plays in Amsterdam and The Hague.

Bingley, England, a parish of the west riding of Yorkshire, containing a town of the same name, on the Aire, 5½ miles north-west of Bradford. The town contains the interesting church of All Saints (restored 1871) in the Perpendicular style, several other places of worship, an endowed grammar-school, and a mechanics' institute. The chief industry is worsted-spinning. Pop. (1901) 18,448.

Bingtang, bing-tāng', an island of the Rhio-Linga group, in the Malay archipelago. Mount Bingtang, its highest peak, 1,368 feet high, is in lat. 1° 4' N., lon. 104° 28' E.; Rhio, the Dutch free port, is in lat. 54' 40" N., lon. 124° 26' 30" E. Area of the island, 403 square miles; pop. with Rhio, situated on Tanjong Pinang, an adjoining islet, about 20,000. The geological formation is granite, overlaid with cellular clay ironstone. Iron and tin are found, but not as yet extensively mined. The gambier plant (*uncaria gambier*), which produces terra japonica, is the chief product of the island. A large number of gambier plantations are cultivated by Chinese colonists, who cultivate black pepper at the same time; the refuse leaves of the gambier, after obtaining the coagulated decoction of commerce, being excellent manure for the latter plant. Other productions are cocoa-palm, durian-fruit, much prized by the natives, caoutchouc, gutta-percha, and damar. Many valuable timber trees are found on the island. The native

Malays, who are rude hunters and fishermen, like the Orang Benua of the Malay peninsula, are now outnumbered by the enterprising Chinese.

Binion, Samuel A., American scholar and author: b. Balvirziski, province of Suwalki, Poland, 1 May 1842. He was educated at the universities of Breslau and Padua and in King's College, London; was a reader in the British Museum and a superintendent of schools in Seville and the Balearic Islands; and was for several years connected as a post-graduate with the Johns Hopkins University in Baltimore, where he also catalogued the works on Oriental languages in the Peabody Museum. He has contributed to current encyclopedias, translated from the Polish Sienkiwicz 'Quo Vadis,' 'With Fire and Sword,' and 'Pan Michael,' and published 'Ancient Egypt, or Mizraim.'

Binmaley, bin-ma-lā's, Philippines, a town of the province of Pangasinan, Luzon, situated on the Gulf of Lingayen, in the western part of the Island of Luzon, only a few miles east of the town of Lingayen. Pop. 13,787.

Binney, Amos, American merchant and naturalist: b. Boston, Mass., 18 Oct. 1803; d. Rome, Italy, 18 Feb. 1847. He graduated at Brown University in 1821, engaged in business with success, and devoted his leisure to natural science. He was one of the founders, and at the time of his death, president, of the Boston Society of Natural History. His writings on the land shells of America are in the 'Journal' and 'Proceedings' of that society. His chief work, 'Terrestrial and Air-Breathing Mollusks of the United States and Adjacent Territories of North America' (3 vols. 1847-51) was issued under the direction of Dr. A. A. Gould.

Binney, Hibbert, Canadian clergyman: b. Nova Scotia, 12 Aug. 1819; d. 1887. He graduated at Oxford University in 1842. He became bishop (Anglican) of Nova Scotia and Prince Edward Island in 1851, this being the first instance of England founding a bishopric in her colonies. He attended the General Convention of the Protestant Episcopal Church held in Chicago in 1886.

Binney, Horace, American lawyer: b. Philadelphia, 4 Jan. 1780; d. 12 Aug. 1875. He graduated at Harvard in 1797; and for many years was at the head of the Pennsylvania bar. He had a number of distinguished cases in his career; the most noted one being the defense of the city of Philadelphia against the executors of Stephen Girard. He was a member of the 23d Congress; and a director in the United States Bank. He wrote many valuable papers, and was the author of 'The Leaders of the Old Bar of Philadelphia,' 'The Privilege of the Writ of Habeas Corpus Under the Constitution,' and 'Reports of Cases in the Supreme Court of Pennsylvania' (6 vols.).

Binney, Thomas, English theologian: b. Newcastle-on-Tyne, 1798; d. 1874. He was pastor of Weigh House Chapel, London, for 40 years, and was a voluminous writer on polemical subjects, his most successful ventures as an author being the hymn 'Eternal Light! Eternal Light,' and 'Is it Possible to Make the Best of Both Worlds?' a work for young men.

BINNIE — BIOGRAPH

Binnie, Sir Alexander R., English civil engineer: b. London, 26 March, 1839. He was educated at private schools. He worked on Welsh railways 1862-6, and for the Indian Public Works Department 1868-74; was engineer of the city of Bradford 1875-90; constructed the Nagpore waterworks, the Black-wall tunnel, the Bradford waterworks, the Barking Road Bridge, etc. In 1897 he was made chief engineer of the London County Council. His publications include articles and reports on professional subjects, lectures on waterworks, papers on rainfall, etc.

Binna, Charles Fergus, Anglo-American ceramic expert: b. Worcester, England, 4 Oct. 1857. A son of the director of the Royal Porcelain Works in his native city, he was superintendent of various departments there, 1872-97. Leaving England in the last named year he was principal of the Technical School of Science and Art, Trenton, N. J., 1897-1900, and since June, 1900, has been director of the New York State School of Clay Working and Ceramics. He has written 'Ceramic Technology' (1896); 'The Story of the Potter' (1897).

Binocular Microscope, etc. See MICROSCOPE; OPERA GLASS; TELESCOPE; etc.

Binomial, in algebra, a quantity consisting of two terms or members, connected by the sign + or —. The binomial theorem is the celebrated formula which shows how to obtain any power of a given binomial, as $a + b$, from the two terms, a and b , and the exponent of the power. This theorem, frequently called the Newtonian theorem, on which the system of analysis is principally founded, was known, as far as relates to integral positive exponents, to several mathematicians before Newton. But Newton was the first who taught its application to fractional and negative exponents; and this discovery, one of the most important of those made by that great man, is engraved upon his tombstone.

Binondo, Philippines, a native town near Manila, on the right bank of the Pasig; now a suburb of the walled European city, having been annexed to it by a magnificent stone bridge 411 feet in length. The bridge of Binondo is regarded as the most remarkable structure ever erected by Europeans in the Indian archipelago.

Binturong, a large civet of the Malay Peninsula and Islands, which spends its life in the trees, where it is assisted in climbing about by its long, bushy, prehensile tail. It passes the day asleep in the top of a tree, and travels about at night in search of small mammals, birds, etc., but also eats leaves and fruit. It is gray when young, but black when fully grown, and reaches a length of two and a half feet, exclusive of its long tail.

Binne, bin'wé, or **Benue**, Africa, the largest and most important tributary of the river Niger. See **BENUE**.

Binyon, Laurence, English poet: b. Lancaster, 10 Aug. 1869. He has been an assistant in the British Museum from 1893. Besides editing the 'Shilling Garland' (1895-8)

he has published 'Lyric Poems' (1894); 'Poems' (1895); 'London Visions' (1895-8); 'The Praise of Life' (1896); 'Porphyryon and Other Poems' (1898); 'Western Flanders' (1898); 'Odes' (1900); 'Catalogue of English Drawings in the British Museum' (1898-1902); 'Dutch Etchers of the 17th Century'; 'Lives of John Crome and John Sell Cotman.'

Biobio, bé'ô-bé'ô, Chile, an eastern province with the Argentine Republic on the east, and the province of Concepcion on the west and north. It is well-wooded, and there is a good trade in timber; the river Biobio (q.v.) flows through it, and the railroad from Concepcion to Angol crosses the western part. Capital, Los Angeles; area, 4,158 square miles; pop. 122,729.

Biobio, the largest river of Chile. It has a west-northwesterly course of about 200 miles, from near the volcano of Antuco in the Andes to Concepcion on the Pacific Ocean. It is two miles wide at its mouth, and is navigable for 100 miles.

Biogenesis, the genesis or origin of all living beings from living beings. It is opposed to abiogenesis, which implies that at the present time the simplest, lowest forms of life may arise by spontaneous generation (q.v.). Biogenesis, or biogeny, is divided into *ontogeny*, or the development of any individual organism, and *phylogeny*, or the development of the class or other group of organisms, to which the individual belongs. Biogenesis also may be extended to comprise the different modes of reproduction (q.v.) whether sexual, or asexual, or by fission or budding. The principle of biogenesis was first placed on a scientific basis by Harvey, who demonstrated that living beings arise from eggs, as stated in his famous aphorism, *omne vivum ex ovo*. As now modified all organisms are known to arise from living matter, that is, either from germs, spores, seeds, or eggs. See **EMBRYOLOGY**.

Biogenetic Law. See **RECAPITULATION THEORY**.

Biograph, an apparatus that displays in rapid sequence a long series of photographs. It belongs to a class of apparatus which followed the invention of the kinetoscope, and includes the vitascope, cinematograph, phantoscope, etc. It differs from the kinetoscope in that instead of showing small pictures through an enlarging lens by reflected light, it projects them on a screen.

The biograph may be described as a stereopticon combined with such mechanism as is requisite for the precise manipulation of the celluloid picture film. When the apparatus is set in motion the long band of celluloid passes quickly, though not continuously, behind the projecting lens, between spools or bobbins which revolve at a uniform rate. While thus passing from its original spool to the winding reel the film encounters certain pulleys and toothed rollers that serve to direct its movements accurately. Along its edges are numerous small perforations into which the teeth of the rollers fit with precision, and by this means the small transparencies are made to occupy exactly similar positions when their images are projected

BIOGRAPHY

upon the canvas. As each picture in its turn attains this critical position it is momentarily brought to a standstill. At the same time a shutter is opened and an image of the picture flashes for an instant upon the screen. The shutter is then quickly closed, the picture resuming its motion, while its successor in the series is brought into a similar fixed situation. This temporary stoppage of the film (or rather of a portion thereof), as each picture attains its proper place behind the projecting lens, is a very essential feature of the process.

At the instant of its arrival a portion of the film on the preceding side of the picture will be in an unstrained or slack condition. The "slack" is then taken up by a continuously moving sprocket pulley, whereupon a rod or roller is quickly brought to bear against the now tightened film, pressing it to one side and as quickly releasing it. By this movement the next picture is pulled into its fixed position, while the film is made taut (or nearly so) on the following side of this picture. These operations are repeated continuously until the entire film has passed through the holding device in rear of the lens.

The camera used in taking the negative from which motion pictures are made is provided with a similar mechanism to that employed in showing the finished photographs. The picture roll is replaced by a roll of sensitized film, upon which the exposures are made at the rate of from 25 to 50 per second. The films range in length from 50 to 200 feet, and contain, when finished, from 800 to 3,000 negatives. After the film has been subjected to the usual photographic operations it is made to pass, in contact with a second sensitized film, beneath an incandescent lamp, and by this means the photographs are printed upon the sensitized surface. This second film is then in turn passed through the various photographic processes, and when complete it is wound on a spool which may then be placed in the machine used for exhibiting the pictures.

Biography, in its general sense, literature treating of the lives of individuals; in its restricted meaning the history of a person's life. When composed by the subject of the narrative it is called an autobiography. Biography has existed in one form or another from the most ancient times. In the book of Genesis there are biographies, or at least memoirs of Adam, Noah, Abraham, Isaac, Jacob, Joseph, and others. Homer's 'Odyssey' may be considered as an extended biography of Ulysses, limited, however, to the most interesting period of his life, that of his wanderings. Though the 'Iliad' may be loosely called a history of the Trojan war, yet, accurately, it is a chapter from the biography of Achilles, describing calamities he brought upon the Greeks by the revenge which he took on Agamemnon for carrying off his female captive Briseis. The most elaborate Greek biography was Plutarch's 'Parallel Lives' ('Bioi Paralleloi'), consisting of 46 memoirs of Greek, Roman, and other celebrities: it was published about 80 A.D. In 44 B.C. Cornelius Nepos had sent forth a biographical work, his 'Vitæ Imperatorum' ('Lives of Commanders'). Under

the Greek and Roman civilization, however, the individual was absorbed in the state. When Cincinnatus or Coriolanus is mentioned, we recall rather an act than a person. The elder Cato wrote a history of the Roman republic, in which there was not found a single proper name. He said simply: "The consul proposed such a law, the general gained such a battle."

Biography differs from history, properly so called, in considering public and national events, if at all, only in their relations to a single personage. It assumes various forms, being sometimes most interested in the circumstances and external career, the *curriculum vitæ*, of its subject; sometimes regarding chiefly intellectual and moral qualities and development; sometimes being hardly more than a catalogue of a man's positions and changes of position; and sometimes, like the autobiography of Goethe, fit to be entitled truth and poetry; sometimes being formally narrative throughout, but often presenting the hero also by his letters and notes of his conversation. A biography may be a panegyric or a diatribe, or the life of a man may be used as only a frame on which to attach moral reflections. Its true aim, however, is to reveal the personal significance of those men who have played a distinguished part in the world, either by action or by thought. History has reference to the development of principles, biography to that of character. To observe the growth of a nation, or of any institution from the idea on which it was grounded, through its vicissitudes and conflicts, is the part of history. To trace a human life, to remark the manifold efforts, defeats, triumphs, perplexities, attainments, sorrows, and joys which fill the space between the cradle and the grave, is the province of biography. In history, Scipio at the head of the Roman legions subdued Africa, and Agesilaus struggled against the misfortunes of his country; in biography, the former is seen not only gaining victories, but also gathering cockshells on the shore, and the latter not only fighting after defeat, but also riding on a hobbyhorse among his children. Plutarch says it does not follow because an action is great, that it therefore manifests the greatness and virtue of him who did it; but on the contrary, sometimes a word or a casual jest betrays a man more to our knowledge of him than a battle fought wherein 10,000 men were slain, or sacking of cities, or a course of victories. Xenophon remarks that the sayings of great men in their familiar discourses, and amid their wine, have somewhat in them which is worthy to be transmitted to posterity.

Modern biographical literature may be considered to date from the 17th century since which time individual biographies have multiplied enormously. Dictionaries of biography have proved extremely useful, Moreri's 'Historical and Critical Dictionary' (1671), being, perhaps, the first of this class. During the 19th century there were published the 'Universal Biography' (85 vols. 1811-62); 'New General Biography' (46 vols. 1852-66); Chalmers's 'General Biographical Dictionary' (32 vols. 1812-17); Rose's 'Biographical Dictionary' (12 vols. 1848-50); Leslie Stephen's 'Dictionary of National Biography' (completed in 63 volumes, the first of which appeared in January 1885, and the last in September 1901); Appleton's 'Cyclopædia of American Biography' (7 vols.

BIOLOGY

1887-1900); White's 'National Cyclopædia of American Biography' (New York); 'Men and Women of the Time' (London); 'Who's Who' (London); 'Who's Who in America' (Chicago); Adams' 'Dictionary of American Authors' (1901); Vapereau's 'Universal Dictionary of Contemporaries' (Paris); 'Lamb's Biographical Dictionary of the United States' (8 vols. 1897, *et seq.*); and 'Canadian Men and Women of the Time.' Among works of more limited aim may be noted various 'Lives of the Saints'; Fox's 'Book of Martyrs'; various 'Lives of the Poets'; Boswell's 'Life of Johnson' (1791); the most noted of all English biographies, Lockhart's 'Scott' (1836-8); Forster's 'Dickens' (1872-4); Gaskell's 'Charlotte Brontë'; Cross' 'George Eliot' (1884); Lonsdale's 'Sister Dorothea' (1878); 'Life of Tennyson,' by his son (1897); 'Life of Huxley,' by his son (1901). Among notable autobiographies are the first Lord Herbert of Cherbury's 'Autobiography'; Benvenuto Cellini's 'Vita da lui Medesimo Scritta'; Rousseau's 'Confessions'; Gibbon's 'Memoirs'; Franklin's 'Autobiography'; Newman's 'Apologia Pro Vita Sua'; Besant's 'Autobiography' (1902); Trowbridge's 'The Story of My Life' (1903); Mrs. Oliphant's 'Autobiography' (1899).

Biology. The study or science of living organisms, and the phenomena of life. Its field is the whole breadth of the organic world, and it seeks to mark the boundaries which separate living from inorganic nature,—to discover the principles that unify it, the processes by which living things have developed, the nature of life itself and the future in store for it. Biology, then, is the sum of all the special departments of study which deal with plants, animals, and man in his animal relations, such as botany, zoology, anthropology, and their subordinate or associated sciences; that is, bacteriology, microscopy, physiology, and many more. In his out-reaching toward the causes and principles underlying its phenomena, the philosophical biologist must therefore understand organic chemistry, and the laws of electricity, light, heat, and mechanics, as they relate to animal needs; and at the other extreme he must consider psychology as an integral part of his domain.

This array of responsibilities and of objects for investigation seems too formidable for any one mind to undertake or a lifetime to encompass, and it would be were not the realm of living nature capable of resolution into simple elements; unified in its fundamental structure; and controlled in its developmental growth by definite "laws of being," which have come more and more clearly into view as knowledge of details has increased. The classification and co-ordination of the enormous mass of facts incessantly poured into his laboratory and library by experimenters and observers, to illuminate the truth by some generalization, or to exhibit a plan, law, type of structure, or growth, is the high purpose of the thoughtful biologist; and the greatest names in the science,—Aristotle, Leibnitz, Harvey, Malpighi, Linné, Buffon, Lamarck, Treviranus (who in 1802 first used the term *biology*), Cuvier, Galvani, Goethe, Lyell, Von Baer, Owen, De Blainville, Leuckart, Agassiz, Darwin, Wallace, Kowalewsky, Müller, Haeckel, Marsh, Cope, Hyatt, Weismann, and many others,—have been those of men who had

these large aims in view, and have contributed toward a solution of the great problem of life. The living world may be pictured as an enormous bundle of tangled and interlaced cords of phenomena, which, moreover, are never quite stationary and fixed, but are always slowly, invisibly, altering and forming new entanglements. Every naturalist is at work upon some part of this bundle, endeavoring to extricate his particular part. In those cases he pays so little attention to anything else, and is so fascinated with the beauty of his single strand, that he draws but little out. In other cases men of larger view or more serious purpose, or societies of them co-operating, disentangle more. The *great* biologist is he who can perceive those who have found a clue, and is able to teach them and the others how still more surely to unravel the intricate threads of phenomena that entwine and conceal the great fact of life at the centre of the puzzle.

To drop the figure, the science of biology in its more restricted and ordinary meaning, is the co-ordination of the observed facts and manifestations of the organic world into laws, and the discovery of the principle from which all proceed; that is, its object is to find an answer to the ever-present question of existence—What is Life? To this end goes on the incessant collection of facts in natural history, and it goes on joyously because any moment the biologist may come upon some fact or suggestion which shall contribute to the grand result.

Progress has been made. The study at first was nothing but a miscellaneous gathering of specimens and records of observations. Then a crude sorting out began. Men at first failed to distinguish between what was animate and what was inert. The winds, the lightning, volcanoes, springs were things of life. Later the broad distinction of organic from inorganic was perceived, but even now it is not known whether some of the manifestations of movement and response in certain "slimes" are purely chemical, or due to the presence of actual life.

The next step was the separation of the two great branches of the organic world—plants and animals. The broad features of these groups must have been apparent to primitive man, but it is only within comparatively recent years that such groups as the sponges, the branching forms of the corals, the spreading growths of the polyzoans, have been definitely placed among the animals. The names, "sea-anemone," "moss-animal," "zoophyte," and the like, show the popular error or doubt as to these forms. The relationship of the minute or even microscopic hydroids and protozoans were still longer in doubt; and to this day there is a borderland in this great group (the Protozoa) of minute, unicellular objects where no one is able to draw a certain line between what should be called a plant and what an animal, or even whether some of the objects are organic at all.

As men perceived certain likenesses and unlikenesses the sorting of plants and animals went on crudely at first, on purely superficial or even fanciful grounds. This sufficed fairly well for some large and well-marked groups, as beasts, birds, fishes, insects, hardwood trees, and the like, yet led to many mistakes, such as placing whales with the fish, and the bats with birds. Meanwhile students here and there had

BIOLOGY

become interested in special groups, and each called his pursuit a science. Thus arose Ornithology—the study of birds: Conchology, the study of shells (in which for a long time little attention was paid to the animal that made them!); Anatomy and Physiology, the study of structure, at first confined wholly to the human form, and only lately to animals in general, when it was distinguished as Comparative Anatomy; Botany, the study of plants; and so on. In each men gathered and recorded specimens and facts, as a rule from a single neighborhood. Nevertheless, curiosity began to inquire beneath the surface. Plants were pulled apart, animals dissected, and resemblances and contrasts of structure were noted. Naturalists traveled, and found that the creatures of the world were more numerous than had been suspected, and varied with climate, soil, height above the sea, and diverse conditions, and when records and specimens from many localities were gradually accumulated in great museums, likenesses and contrasts appeared that had not been visible in the small local cabinet. Materials were thus obtained for more intelligent arrangement, and classification became one of the most important sciences in the scope of biology. The great service an accurate arrangement of living things would render to an inquirer as to their nature, was perceived, and scientific men everywhere searched for facts which should fill the gaps in their knowledge. The criteria were made more and more exact, and as classification was perfected it became increasingly evident that the criteria for all branches were substantially similar, and there came to be perceived certain *plans of structure*. One of the latest and most powerful aids to investigation, the result of the perfecting of the microscope, was the science of Embryology, or the study of the development of a plant from the seed or of an animal from the egg. It went hand in hand with Histology, the study of tissues, and both disclosed the new truth that the structure of both animals and plants was at its basis the same—a cell filled with “life substance” (protoplasm); and that the multiplication of these cells constituted the growth, and their arrangement and limit the form and bulk, of every animal and plant. It was furthermore ascertained that an egg or a seed (in which it is believed that every animal plant begins, in spite of some apparent exceptions) was simply a cell differing, so far as we can yet see, from other cells in the body only by its possession of the potentiality of independent life under the fostering of suitable conditions. Classification had already shown that its groups might be arranged in something like a series from those very simply organized (the one-celled protozoa at the foot of the list) up to the highly complex. Now embryology showed that the changes each individual passed through from egg to birth were a series of changes from simplicity to complexity and furthermore that they suggested a parallel to the features of the successive groups in classification, especially to those of the subordinate ranks of the subject's own class. Palaeontology enforced this by a similar parallel, finding that the most ancient animals fossil in the rocks were of simple and generalized structure as compared with those of more modern geological formations: in other

words, that structural development has also been historic development.

All these facts changed the point of view of the biologist. Instead of looking at separate animals and seeking to find differences upon which to make new species and subdivide groups, he is now seeking for likenesses—points of unity. It was long ago suggested to thoughtful minds that the world was not always as we found it, but that for a vast period there had been a slow, persistent growth and unfolding. The phenomena of the inorganic world pointed the same way, and hence arose the “nebular hypothesis”—the explanatory theory that the universe developed from a gaseous state, and the earth, as one of its parts, was slowly perfected in pursuance of the forces inherent in its origin. Biologists are only carrying this theory out in a detail when they argue that the facts in their hands can be accounted for only by the supposition that the living beings on the earth have been slowly developed from a primitive source, comparable to the germ-cell, along unequal and ramifying lines of progress under the influences of their changeable environment. This is only a detail,—a flower,—of the general unfolding of the universe which is well called its evolution; it is an *organic* evolution.

In the light of this grand generalization biology is now progressing with an organized force for investigation of the great question as to the origin and nature of life. This has not been answered by any of the fruitful hypotheses, like those of Darwin or Lamarck, which have placed so effective tools in the biologist's hands. Toward the solution of this problem all scientific men are working, consciously or unconsciously. In aid of this purpose are pushed forward the incessant and world-wide collection and preservation of preserved animals and plants—museum specimens; and the systematic and accurate observation and record of local species and their habits and instincts. Much of this seems trivial and dry as dust in the eyes of the ignorant or of those whose minds, being occupied with other thoughts, forget the reason and tendency for these ever-multiplied details of natural history. Patient students toil to the same end in laboratories of anatomy and microscopy, laboriously gather statistics of variation, compile lists of geographical distribution, chisel out of the rocks remains of extinct races, and sort and re-sort in experimental classifications—all this in order to provide the generalizers of the science with more and better factors for the solution of the great focal problem, What is Life, and how came it to be? What has been the net result so far? In one direction the conviction of the universal eminence and force of the principle of evolution; in another the realization of the independent life and action of each separate cell. To the study of the constitution, qualities and behavior of the cell, whether standing alone in the unfertilized egg, or as a naked monad, or one in an interdependent association of millions building up a complex organism, has biology come at last; and not until it has vanquished the difficulties presented by this atom of living and potential protoplasm, the cell, will it accomplish its full purpose.

ERNEST INGERSOLL,

Editorial Staff 'Encyclopedia Americana.'

BION OF ABDERA--BIOT

Bi'on of Abdera, Greek mathematician: lived about 400 B.C. He belonged to the family of Democritus, and is said by Diogenes Laertius to have been the first who taught that there were countries in the world where the year consists only of a single day and a single night, each lasting for six months. He must therefore have been acquainted both with the spherical form of the globe and the obliquity of the ecliptic. Unfortunately nothing more is known of his history.

Bion of Borysthenes, Greek philosopher contemporary with Erastosthenes (born 275 B.C.), and with Zeno the Stoic. He studied philosophy at Athens, first under Crates of the Cynic school, then took lessons of Theodorus, surnamed the Atheist; and at last, considering his studies completed, set up for himself. It is not easy to ascertain what his opinions were, as only a few fragments of his numerous writings have been preserved; but he was accused of Atheism, and apparently on good grounds, as he is said to have regarded all questions relative to the nature of the gods and divine providence as indifferent. He died at Chalcis in Euboea about 241 B.C.

Bion of Smyrna, Greek pastoral poet, who flourished in the latter part of the 3d century B.C. He was a contemporary of Theocritus whose manner he imitated. On attaining manhood, Bion emigrated to Sicily, where a conspiracy was formed against him, and he was basely poisoned. The poems of Bion were chiefly pastoral, occasionally erotic. The fragments of them that are extant fully justify the eulogies of his admirer, Moschus. Their sentiments are tender and delicate; their style is copious, graceful, and polished. Seventeen short poems and the famous 'Lament for Adonis' are preserved to us, the last-named furnishing the model for Shelley's 'Adonais.' See Smyth, 'Greek Melic Poets' (1900).

Biondo, Flavio, byōn'dō, flā'vyō, Italian archaeologist: b. 1388; d. 1463. His encyclopaedia have served as the foundation for all subsequent collections of archaeological knowledge. They were called 'Roma instaurata,' 'Roma triumphans,' and 'Italia illustrata.'

Bionomics, in biology, the study of the habits and modes of life, and their relations to each other, to all living beings, and to the world around them. It corresponds to "ecology" and to "biology," as used by German naturalists. Wasmann defines biology in the restricted sense of bionomics as—

"The science of the external conditions of existence, which pertain to organisms as individuals and at the same time regulate their relations to other organisms and to the inorganic environment."

It therefore, he says, embraces in its restricted sense—

"First, a knowledge of the mode of life of animals and plants, their nourishment, dwelling, mode of propagation, the care of offspring and their development, in so far as these present external manifestations; hence also, second, a knowledge of the life-relations that obtain between individuals of the same and different species (including all the phenomena of parasitism, symbiosis, etc.), and hence also, third, a knowledge of the conditions of existence which are essential to the life and maintenance of animals and plants."

By conditions of existence are meant the action on plants and animals of climate, soil, light, gravity, heat, the dryness or moisture in the air and soil: the nature of the water, whether salt,

fresh, or brackish; currents of air, and of water; elevation above the sea, also any other physical and biological agents in causing variation in or the modification of organisms. As Wheeler states:

"Whenever we undertake the detailed or exhaustive study of an ethological problem, we are led imperceptibly into the details of physiology, morphology, embryology, taxonomy, or chorology, according to the particular aspect of the subject under consideration."

Many of these subjects, falling under the head of bionomics, are treated under the head of evolution (q.v.), as the struggle for existence, mimicry, etc. Another department of bionomics is geographical distribution, and distribution in time, together with migration, heredity, hibernation, and seasonal dimorphism. The word "bionomics" seems preferable to "ethology," which has been used as the name of the science of ethics; it is also the more comprehensive term.

Consult papers by Bessey ('Science,' XV. p. 503); Bather ('Science,' XV. p. 748); Wheeler ('Science,' XV. 20 June 1902). The writings of Réaumur, Audubon, Huber, Lubbock, Plateau, Fabre, Ford, Wasmann, Riley, Wheeler and others deal especially with the habits and economy, or bionomics of insects (bees and ants) and birds.

Bi'oplasm, that portion of the protoplasm in living bodies that possesses the physiological qualities of life. This term was first used by Prof. L. S. Beale, an English scientist; the word protoplasm had formerly been used in an analogous sense, but Prof. Beale considered that a much wider meaning had been given to this latter term by Huxley and others and therefore introduced the use of the word bioplasm with its narrower signification.

Biot, Edouard Constant, be-ō, ā-doo-ār kōn-stān, French Chinese scholar of eminence: (son of Jean Baptiste Biot) b. Paris, 2 July 1803; d. 12 March 1850. After accompanying his father on a scientific tour to Italy in 1825-6, he undertook the construction of a railway from Lyons to St Etienne, the first in France. In 1833 he retired from active life, and devoted his leisure to the study of the Chinese. He was the author of 'Causes de l'Abolition de l'Esclavage Ancienne en Occident' (1840). As the result of his studies on China he published numerous articles in the 'Journal des Savants' and 'Journal Asiatique,' as well as several larger works, more especially 'Dictionnaire des Noms, Anciens et Modernes, des Villes et Arrondissements compris dans l'Empire Chinois' (1842); and 'Essai sur l'Histoire de l'Instruction Publique en Chine' (1847). Besides translations of Chinese works,—for example, the historico-chronological 'Tcheou-chou-ni-kien' (Paris 1842), and the 'Astronomical Tcheou-pei,'—he wrote a 'Notice sur quelques Procédés Industriels connus en Chine, au 17me Siècle'; an 'Examen de diverses Séries de Faits relatifs au Climat de la Chine'; and 'Chine et Indo-Chine.' The printing of his translation of the Chinese Imperial Geography, 'Tcheou-li,' was interrupted for some time by his death.

Biot, Jean Baptiste, be-ō, zhōn bāp-test, French mathematician and physicist of distinction: b. Paris, 21 April 1774; d. there, 3 Feb. 1862. He was educated at the Collège

BIOTITE — BIRCH

Louis-le-Grand, and in 1793 entered the artillery service. Shortly afterward he entered the *École Polytechnique*, and thenceforth devoted himself to the study of mathematics and the natural sciences. After teaching physics for some years at Beauvais, he became professor of the same subject in the *Collège de France* in 1800, and in 1803 was elected a member of the Institute. In 1804 he made a balloon ascent with Gay-Lussac, and in 1806 was made a member of the *Bureau des Longitudes*. In 1809 he became also professor of physical astronomy in the University of Paris. With the exception of three journeys, undertaken in connection with the measurement of a degree of the meridian, — namely, to Spain in 1806-8, to Scotland, Orkneys, and Shetland in 1817, and to Spain and Italy in 1824-5, — his whole life was quietly passed in study and teaching. He published some excellent text-books, which became widely known beyond France, such as the '*Essai de Géométrie Analytique*'; '*Traité de Physique Expérimentale et Mathématique*'; and '*Traité Élémentaire de Physique Expérimentale*,' as well as works on the astronomy of the ancient Egyptians, Indians, and Chinese. His most valuable contributions to science, however, are chiefly contained in communications to learned societies and periodicals. There are few branches of physics which were not advanced by his labors; and in optics especially he made some valuable investigations, particularly in connection with refraction and polarization. See **CURVES**.

Bi'otite, a mineral of the mica group, having its characteristic monoclinic crystallization and very perfect cleavage. Its chemical composition varies widely, but in general it may be said to be a silicate of aluminum, magnesium, iron, potassium; with hydrogen. On account of the presence of magnesium, it is sometimes called "magnesia mica." In color, biotite varies from green to black. It has a hardness of from 2.5 to 3, and a specific gravity of about 2.9. It is a common constituent of granite and gneiss, and of many eruptive rocks, such as andesite and trachyte. Biotite was named for the French physicist, J. B. Biot (q.v.).

Bipen'nis, a double-headed battle-axe, mentioned in Homer. The Greek literature attributes its use to the barbarians, most especially to the Amazons. Such axes have been found in stone.

Bipelta'ta, a name given by Cuvier to a family of *Crustacea*, so called because the carapace is divided into two parts or shields; the anterior shield is large, oval in shape, and corresponds to the head; the posterior is angulated in outline, corresponds to the thorax, and bears the foot-jaws and ordinary feet. This family is one of those making up the order of *Stomopoda*, and is now very generally known under the name of *Phyllosomidæ*.

Bipes, bi'péz, (1) a genus of reptiles belonging to the order *Suaria*, in which the posterior feet only are visible, though the rudiments of the anterior extremities appear under the skin. This genus is the connecting link between the lizards and the snakes. (2) The name given to a lizard from the Cape of Good Hope, which is called *Anguis bipes* by Linnæus and *Scelotes bipes* by Gray.

Bipont Editions, famous editions of the Latin classics, published in Bavaria in the city of Deux Ponts, whose name in German is *Zwei-brücken*, and in Latin *Bipontium*. The publication was begun in 1779, but after the French conquest was finished in Strasburg. The collection forms 50 volumes octavo.

Birago, bê-râ'gô, **Karl, Baron von**, Austrian military engineer: b. Cascino, d'Olmo, 24 April 1792; d. Vienna, 29 Dec. 1845. He studied mathematics at Pavia; was a teacher in a military school in Mailand, and in 1825 invented the military bridge which is named for him. He assisted at the building of the fortifications of Linz, the fortifications of the Po near Brescello, and in 1839 built a military bridge across the Po which was especially successful. Nearly all the Continental armies have since adopted his system of bridge construction. In 1844 he was in command of the newly organized Pioneer and Pontonier Corps and became commander of a brigade. He wrote '*Researches in European Bridge Construction*.'

Birbhum, bêr'boom, a district of the Division Bardwan in Bengal. It is crossed by a few unimportant rivers; has hot springs, iron mines and limestone deposits. The chief agricultural product is rice; there is also a large silk-worm industry. For over 2,000 years Birbhum was the scene of the conflicts of the Aryans advancing into Bengal from Hindustan.

Biquadrat'ic Equations, in algebra, equations containing but one unknown quantity, of which, in the equation, the highest power is the fourth. An equation of this kind, when complete, is of the form $x^4 + Ax^3 + Bx^2 + Cx + D = 0$, where A, B, C, and D denote any known quantities whatever. See **EQUATION**.

Bir, bêr, or **Birejik**, a town in Asiatic Turkey, 80 miles northeast of Aleppo, on the side of a steep hill on the left bank of the Euphrates, which is here about 600 yards wide, and 10 to 12 feet deep. The town is surrounded on the land side by a wall, with towers at the angles, and pierced with loopholes. The streets are narrow but clean. In the centre, on a steep rock, is an old ruined fortification. Bir has long been the point where caravans and travelers from Aleppo to Orfah, Diarbekir, Bagdad, and Persia, cross the Euphrates. Pop. 8,000.

Birague, René de, bê-râg, rê-nâ dê, Italian politician: b. Milan, 1507 (or 1506); d. 1588. He incurred the hostility of Louis Sforza the duke, but in France, Francis I. received him favorably, made him counselor of the Parliament of Paris, and governor of Lyonnais, and sent him to the Council of Trent. Under Charles IX. his advancement was still more rapid, and in 1570 he was made keeper of the seals. In this capacity he was a party in the secret council at which the massacre of St. Bartholomew was organized. He zealously defended the Catholic cause against the inroads of French Calvinism, both in its religious and its political aspects. He was bitterly hated by the Huguenots, who in consequence made many derogatory accusation against him. He was made a cardinal in 1578, and held the bishopric of Lavaur and several rich abbeys. He died chancellor of France.

Birch, **Harvey**, the principal figure in Cooper's novel, '*The Spy*,' a romance of the American Revolution.

BIRCH

Birch, John, English soldier: b. 7 April 1616; d. 10 May 1691. A Presbyterian in religion, he took the side of the Parliament, acting as a captain of volunteers at the siege of Bristol by the Royalists. On the institution of the "new model" he was ordered to join the army of Fairfax and Cromwell in the west of England, and had Bath entrusted to his care. He commanded a body of horse and foot at the storming of Bristol, an affair in which he so highly distinguished himself as to receive special commendation from Cromwell in his report to the Parliament. In 1645 he was sent against Hereford, and by a stratagem succeeded in gaining possession of the city, and with this the special thanks of Parliament. He objected to many of the proceedings of the party of Cromwell, and was repeatedly thrown into prison. He took an active part in bringing about the restoration of Charles II., and in the latter part of his life was a prominent member of Parliament. He was a man of great personal strength and stature, a rough but most effective public speaker, and had remarkable talents for business and practical affairs.

Birch, Samuel, distinguished English Egyptologist: b. London, 3 Nov. 1813; d. there, 27 Dec. 1885. At the age of 23 he was appointed an assistant in the department of antiquities in the British Museum. He gradually rose to higher positions in the museum, and latterly became keeper of the department devoted to Egyptian and Oriental antiquities, a post which he retained till his death. His whole life was devoted to studies and work connected with his official duties, and was naturally uneventful. His labors did much to advance the study of Oriental archaeology, and his eminence in his own province was duly recognized by learned bodies and institutions. In 1870 he assisted in founding the Society of Biblical Archaeology, and became its first president, frequently contributing to its 'Proceedings' and 'Transactions.' In 1874 he successfully presided over the International Congress of Orientalists that met in London in that year. His studies ranged over a wide field, but it is on his eminence as an Egyptologist that his reputation chiefly rests. It has been said that "he found the language of Egypt a puzzle, and left it at his death in the position of one of the most important philologies of the world." Among his works, exclusive of contributions to learned societies, encyclopædias, etc., are: 'Introduction to the Study of the Egyptian Hieroglyphs' (to accompany Gardiner Wilkinson's work on Egypt; 1857); 'History of Ancient Pottery, Egyptian, Assyrian, Greek, Etruscan, and Roman' (1857); 'Himyaritic Inscriptions of Southern Arabia' (1863); 'Dictionary of Hieroglyphics and Grammar of the same in the fifth volume of the English edition of Bunsen's 'Egypt's Place in the Universal History' (1867); 'Guide to the Egyptian Galleries of the British Museum' (1874); 'New Edition of Wilkinson's Manners and Customs of the Ancient Egyptians' (1878). For full account of his life and work, see 'Transactions of the Society of Biblical Archaeology' Vol. IX. (1893).

Birch, Thomas, English historian: b. London, 23 Nov. 1705; d. there, 9 Jan. 1766. His early taste for reading induced him to prefer a literary life, which he was permitted to choose

on condition of supporting himself by his own exertions. He took orders in the Church in 1730, and obtained in 1732 a living in Essex. In 1734 he engaged with some coadjutors in writing the 'General Historical and Critical Dictionary,' founded on that of Bayle, and completed, in 10 volumes folio, in 1741. He subsequently obtained various preferments in the Church, and for about 20 years before his death held the rectories of St. Margaret Pattens, London, and Depden, in Suffolk. Birch had formed very extensive manuscript collections, which, together with his library of printed books, he bequeathed to the British Museum. He produced a large number of historical and biographical works in the course of his laborious life, and served as one of the pioneers of literature. He collected fully and faithfully, but without much discrimination, materials relating to the various subjects of his research, which are calculated to afford important assistance to writers possessed of more taste and judgment. Among his works are: 'Life of the Right Honorable Robert Boyle'; 'Historical View of the Negotiations Between the Courts of England, France, and Brussels,' 1592-1617; 'Life of Archbishop Tillotson'; 'Memoirs of the Reign of Queen Elizabeth, from 1581 till Her Death'; 'History of the Royal Society of London'; 'Life of Henry, Prince of Wales.'

Birch, Thomas, American painter: b. London, England, 1779; d. Philadelphia, Pa., 3 Jan. 1851. Coming to the United States in 1793, he settled in Philadelphia, and painted chiefly portraits until 1807, when he took up marine painting, in which he achieved a high reputation. A number of his works represent naval battles of the War of 1812, and of these the paintings representing the engagements between the United States and the Macedonian, and between the Constitution and the Guerrière, are the best known. Both are in the Harrison collection at Philadelphia.

Birch-Pfeiffer, Charlotte, bër'n'pfif-ër, shär-löt'tä, German actress and dramatic writer: b. Stuttgart, 23 June 1800; d. 24 Aug. 1868, her maiden name being Pfeiffer. She first appeared on the stage in her 13th year at Munich, and soon acquired a great reputation, her special role being that of the heroines of tragedy. In 1825 she married Christian Birch, a writer of some note. After playing with success at places as far apart as St. Petersburg, Amsterdam, and Budapest, in 1837 she took the management of the theatre at Zürich, and remained in this capacity till 1843. Next year she was engaged for the Theatre Royal, Berlin, and here she remained till her death. Her plays, mostly founded on novels, became well known on almost every stage in Germany, and give evidence of real dramatic talent, as well as of a knowledge of stage effects and what would suit the taste of the theatre-going public. Victor Hugo's 'Notre Dame' and Charlotte Brontë's 'Jane Eyre' furnished her with materials for two of her dramas. She also wrote novels and tales. Her collected dramatic works appeared at Leipsic in 23 volumes (1863-80); her narrative writings in three (1863-5). Her daughter has become well known as a novelist under the name Wilhelmine von Hillern.

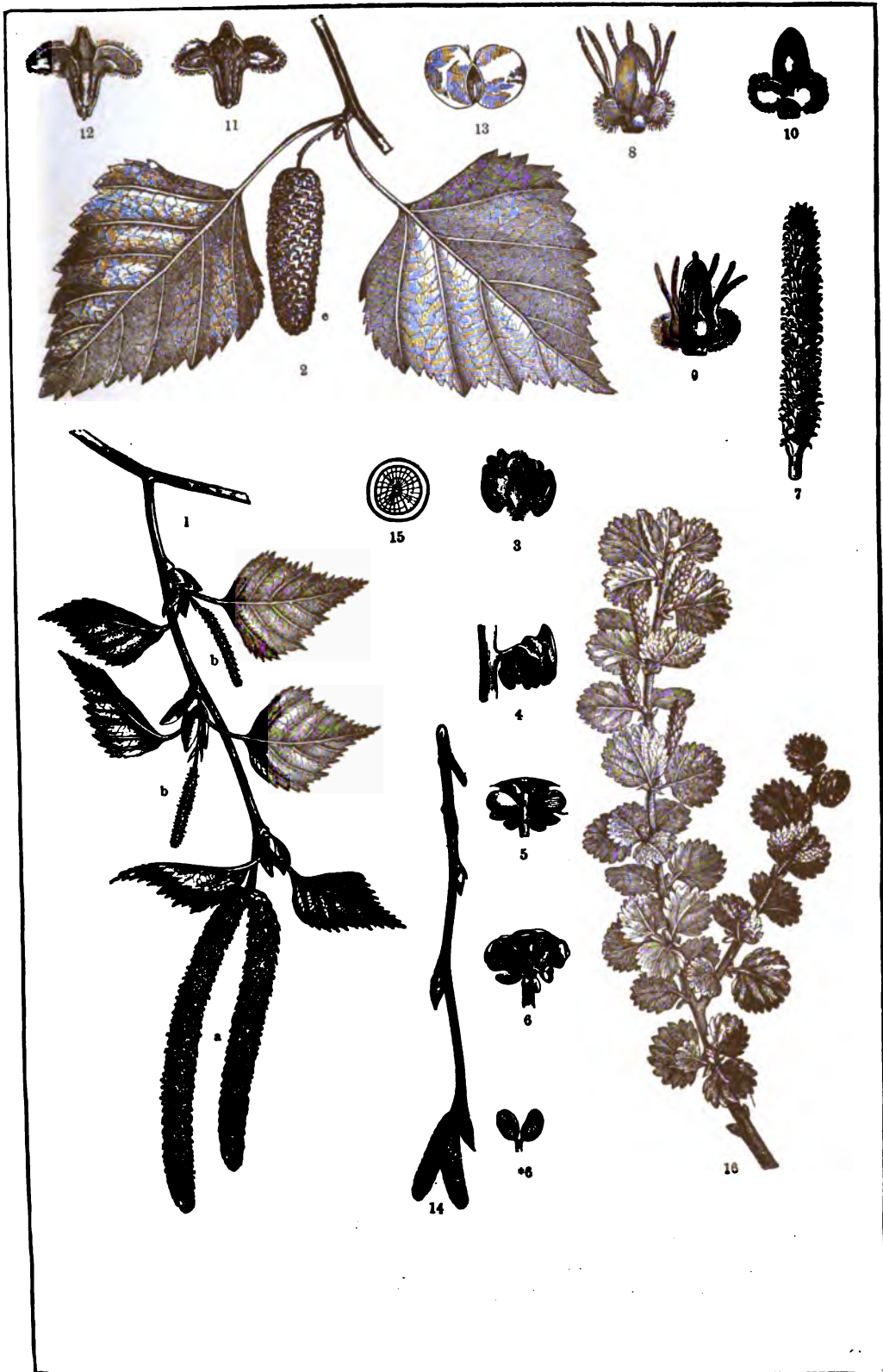
Birch (*Betula*), a genus of trees belonging to the natural order (or sub-order) *Betulaceæ*,

BIRCH

which comprises only the birches and alders. The principal habitats of the trees of this order are North America, Europe, northern Asia, and the Himalayas. The common birch is indigenous throughout the north, and on high situations in the south of Europe. It is extremely hardy, and only one or two other species of trees approach so near to the North Pole. There are two varieties natives of Great Britain, *Betula alba*, and *B. alba pendula*, or weeping-birch; the latter by far the more valuable and ornamental. When young it may readily be distinguished by the touch, its bark being covered over with rough exudations, while that of the common tree is soft and velvety. Each variety is found exclusively in some districts, but frequently they are interspersed. Throughout the most remote parts of the Highlands of Scotland the birch is often found covering extensive tracts or rocky elevations, where no other ligneous plant is to be met with. It also grows in glens and ravines, adorning the margins of lakes and rivers, where the silvery whiteness of its trunk and the light and airy habit of its spray form beautiful and interesting pictures, even in the absence of every other tree. Though often found associated with the alder on swampy ground, yet few trees more successfully resist drought. Adapting itself to various soils and situations, it possesses a wider range than any other tree. It is well suited to form a cover on ground from which Scotch pine timber has been recently removed; the exuviae, which always overspreads such places, though hostile to plants in general, are favorable to the birch, which commonly springs up and becomes the successor of the pine. The common tree, where it grows wild, attains a height of about 30 feet, and the weeping variety about 40 feet; but both sorts rise to a much greater height when formed into plantations, particularly when interspersed with other trees. Although the birch is considered by no means a valuable tree, yet its wood, which is light in color, and firm and tough in texture, is used for a variety of purposes. Not long ago, in many parts of the Highlands, the birch may be said to have been the universal wood, and was used by the Highlanders for every purpose. They made their beds, chairs, tables, dishes, and spoons of it, and even manufactured ropes and horse-harness by heating and twisting its spray. The brushwood is used in forming wicker fences to prevent the inroads of cattle and sheep, in thatching cottages, and in forming brooms or besoms. The wood is largely used for fish-casks and hoops, and for smoking hams and herrings. Turners use it for trenchers, bowls, ladles, and other wooden ware. Ox-yokes, small screws, women's shoe-heels, pattens, and in France wooden shoes are made of it. Birch-trees are not unfrequently planted along with hazels, for the purpose of procuring wood to be converted into charcoal for forges. This charcoal is much esteemed, and the soot which is formed on burning the wood constitutes a good black substance for printers' ink. Nearly all the other parts are applicable to useful purposes. The bark is employed in the tanning of leather; and by fishermen for preserving their nets and cordage. In America, northern Europe, and Asia it is utilized for a great variety of purposes. The North American Indians use it for canoes, boxes, buckets, baskets, kettles, and dishes, curiously joining it together with threads made of roots of

the cedar-tree. It is serviceable in dyeing a yellow color. In Norway it is dried, ground, mixed with meal, and boiled with other food for swine. The houses or huts in many parts of the north of Europe are covered with the outward and thicker part of the bark, instead of slates or tiles. It is spun into a coarse kind of cordage, woven into shoes and hats, and in some places even made into drinking cups. The Laplanders fasten together large pieces of it to keep off the rain. Abounding in resinous matter, slices of the bark are sometimes tied together to make torches. During a scarcity of corn it has, in several instances, been ground with bread corn, and successfully used as food for men. The leaves afford a yellow dye. The sap, from the amount of sugar it contains, affords a kind of agreeable wine. Birch-wine is produced by the tree being tapped by boring a hole in the trunk, during warm weather, in the end of spring, or beginning of summer, when the sap runs most copiously. It is recorded that during the siege of Hamburg, in 1814, many birch-trees in that vicinity were destroyed in this manner by the Russian soldiers. The dwarf birch, *Betula nana*, is a low shrub, a native of parts of the Highlands of Scotland and of Arctic regions generally. It is never more than two or three feet high, and is generally much less; a full-grown plant being thus a very tiny example of a tree. It is used as fuel, and as stuffing for beds, and its seeds furnish food for ptarmigan and other birds. A similar species is a native of the Antarctic regions. Among others the black or river birch of North America (*B. nigra*), grows to the height of 70 feet, and produces hard and valuable timber. It is also known as the red birch, from the redness of the bark in the young trees. Another American species, the cherry birch or sweet birch (*B. lenta*), is also called the black birch. It grows to a similar height with the preceding, and yields even more valuable timber, used in making furniture, etc., being tough, fine-grained, and taking on a good polish. It has been introduced into Great Britain though not much known there. The paper birch (*B. papyracea*) is another American species which also attains a large size, and by some is regarded as a mere variety of the white or common birch. Its habitat extends within the Arctic Circle, but it becomes rare and stunted in the extreme north. It receives its name from the fact that thin strips of the brilliant white bark are sometimes used as a substitute for paper. The bark of this species is put to perhaps a greater variety of uses than that of any other, its wood and sap being also utilized. Another American birch is the yellow birch (*B. excelsa*), so named from the golden color of the outer bark. It is a large-leaved species, yielding timber used for ship-building, etc., and is a native of the eastern parts of Canada and the northeast of the United States. Of Himalayan species may be mentioned *B. bhajputra*, the Indian paper birch. Its thin papery bark has been used as paper from a remote period, and is still commonly used for packing purposes, for lining the flexible tubes of hookahs, and in other ways, while the wood is tough, and is employed in making articles of various kinds. In its native mountains it may be found at an altitude of 10,000 to 13,000 feet. Several of the pigmy species deserve mention. *B. pumila*, which is generally

BIRCH.



1. Spray with *a*, male and *b*, female flowers.
2. Twig with *c*, fruit.
- 3-6. Various views of a single male flower.
7. Female catkin.
- 8-10. Various views of a single female flower.

- 11-12. Details of fruit case.
13. The fruit.
14. Twig with leaf and male flower buds.
15. Section through a branch, three years old.
16. Dwarf Birch (*Betula Nana*).

less than 8 feet tall, but sometimes reaches a height of 15 feet, is found from Newfoundland to Minnesota, and south to Ohio. *B. glandulosa*, which extends from Labrador to Alaska and south to Michigan and in the mountains to Colorado, seldom exceeds 4 feet. *B. nana*, an Arctic species, common to all three continents, rarely reaches a height of four feet. Throughout its range it is an important fuel and its seeds form one of the principal foods of ptarmigan upon which the natives depend to a large extent for flesh food. Like the two other dwarf species mentioned, it is a favorite shrub for planting among rocks. Other species, natives of Europe and Asia, resemble the preceding more or less in appearance and uses. See Bailey and Miller, 'Cyclopædia of American Horticulture' (1900-2); Regel, 'Monographische Bearbeitung der Betulaceæ' (1861); DeCandolle, 'Prodromus' 16^o (1869).

Birchard, Isaac James, Canadian educator: b. Uxbridge, Ont., 11 Oct. 1850. He was principal of a public school in Toronto, 1874-80; master of mathematics at Brantford College Institute in 1882-93; and in 1900 was master of mathematics in the Toronto College Institute. He is best known as the author of the textbook, 'Plane Trigonometry for Schools and Colleges,' and as the joint author of 'High School Algebra.'

Birchenough, bérch'e-nô, Mabel (BRADLEY), English novelist, third daughter of the late H. G. Bradley, dean of Westminster, and wife of Henry Birchenough, a writer on statistics. She has written: 'Disturbing Elements'; 'Pots-herds'; 'Private Bobs.'

Bird, Arthur, American musician: b. Cambridge, Mass., 23 July 1856. He conducted the Milwaukee Musical Festival in 1886 and since that date has lived in Berlin. In addition to a symphony and various pianoforte numbers he has composed a comic opera, 'Daphne' (1897) and a ballet, 'Rübezahl.'

Bird, Charles, American military officer: b. Delaware, 17 June 1838. He entered the volunteer service in 1861, as first lieutenant, 1st Delaware Infantry; was promoted lieutenant-colonel, 9th Delaware Infantry, in 1864; and was commissioned colonel of the 1st United States Veteran Infantry, 24 Dec. 1865. On 2 March 1867 he was brevetted first lieutenant and captain in the United States army for gallantry in the battle of Fredericksburg, major for Spottsylvania, and lieutenant-colonel for Petersburg, Va. He was appointed a second lieutenant, 14th United States Infantry, in 1886; promoted to major and quartermaster in 1895; and commissioned a colonel and quartermaster of United States Volunteers for the war with Spain in 1898. He became brigadier-general in the regular army 16 April 1902 and was retired 17 June 1902.

Bird, Edward, English painter of note: b. Wolverhampton, 12 April 1772; d. Bristol 1819. He took up art as a profession, without any regular training, and carried on a school of drawing at Bristol. In 1807 he exhibited some pictures at Bath, and had the good fortune to find purchasers for them. In 1809 he had a picture, 'Good News,' in the exhibition of the Royal Academy, and so successful was this work that his name at once became known. He

was elected an associate of the Academy in 1812, and his reputation was increased by such paintings as the 'Surrender of Calais,' the 'Death of Eli,' and the 'Field of Chevy Chase'—the last considered his greatest work. The 'Death of Eli' was sold for 500 guineas, and was awarded a premium of 300 by the British Institution. In 1815 he became a full member of the Royal Academy, and he was also appointed court painter to Queen Charlotte. Among his last pictures were the 'Crucifixion'; 'Christ led to be Crucified'; the 'Death of Ananias and Sapphira'; and the 'Burning of Ridley and Latimer.' His talents, however, were considered to be rather for genre than for historic or sacred subjects.

Bird, Frederic Mayer, American Episcopal clergyman: b. Philadelphia, 28 June 1838; d. South Bethlehem, Pa., 3 April 1908. He was rector at Spotswood, N. J., 1870-4; chaplain and professor of psychology, Christian evidences, and rhetoric, at Lehigh University, 1881-6; and acting chaplain there, 1893-8. He was noted as a hymnologist, and collected one of the most complete and valuable musical libraries in the United States. He edited several collections of hymns; was associate editor of 'Chandler's Encyclopædia'; editor of 'Lippincott's Magazine' (1893-8); and published 'The Story of Our Christianity' (1893).

Bird, Golding, English medical and scientific writer: b. Downham, Norfolk, 1814; d. 27 Oct. 1854. In 1838 he took the degree of M.D. at St. Andrew's, and in 1840 that of M.A. In the latter year he became a licentiate of the Royal College of Physicians, London, and in 1845 was elected a Fellow. In 1843 he was appointed assistant physician at Guy's Hospital, where he also lectured on materia medica; and in 1847 he entered on a three years' course of lectures on the same subject at the College of Physicians. He took an active interest in natural history, chemistry, and other subjects more or less connected with medicine; and his multifarious occupations overtaxed his strength and undermined his health, so that he died at a comparative early age. He had by this time acquired a very large practice, and had made his name well known in his profession, more especially by his researches in scientific medicine. A work by which he was more generally known was his 'Elements of Natural Philosophy,' for many years a text-book. A well-known work on 'Urinary Deposits' was also published by him, as also 'Lectures on Electricity and Galvanism in their Physiological and Therapeutical Relations'; 'Lectures on Oxaluria'; etc.

Bird, Isabella. See BISHOP, ISABELLA BIRD.

Bird, John, English mathematical instrument maker: b. in the county of Durham, 1709; d. 31 March 1776. He set up in London about 1745 as a maker of scientific instruments, having previously received instructions from Graham, the greatest mechanician of the time. In 1749 he received an order to construct a new brass mural quadrant of eight feet radius for the Royal Observatory. This was used by Bradley and by Maskelyne, and continued serviceable for 62 years. Duplicates of it were soon ordered for St. Petersburg, Cadiz, and the École Militaire, Paris—the last employed by D'Agelet and Lalande in determining the declinations of 50,000 stars. He also furnished Bradley with a

new transit instrument and a 40-inch movable quadrant. Bird's marked superiority to all other makers of the day is strikingly exemplified by the fact that in 1767 the Board of Longitude paid him £500 on his agreeing to take an apprentice for seven years, instruct other persons as desired, and furnish upon oath descriptions and plates of his methods. A result of this arrangement was the publication of two treatises, named respectively 'The Method of Dividing Astronomical Instruments' (1767), and 'The Method of Constructing Mural Quadrants' (1768), each with a preface by Maskelyne, the astronomer-royal.

Bird, Robert Montgomery, American novelist: b. Newcastle, Del., 1803; d. Philadelphia, 22 Jan. 1854. He qualified as a physician, but soon gave up the practice of medicine for literature. He first became known as a dramatist, having written three tragedies,—'The Gladiator'; 'Oraloosa'; and 'The Broker of Bogota',—the first of these often acted by Edwin Forrest. His first novel was 'Calavar' (1834), his second 'The Infidel' (1835)—both of them having their scene in Mexico, at the time of the Spanish conquest. Then followed the 'Hawks of Hawk Hollow'; 'Sheppard Lee'; and 'Nick of the Woods, or the Jibbenainosay' (1837); the last probably the most popular of all his fictions. Its scene is laid in Kentucky soon after the close of the Revolutionary War, and in it we have a lively picture of pioneer life at this date, and the relentless hostilities between the Indians and the early settlers. He also wrote: 'Peter Pilgrim,' a collection of tales and sketches; and 'Adventures of Robin Day,' a novel.

Bird, Birde, or Byrd, William, English composer: b. 1538; d. London, 4 July 1623. He was trained in music under Thomas Tallis, and was appointed organist of Lincoln about 1563. In 1575 the two composers obtained the monopoly for 21 years of printing and selling music and music paper; and on the death of Tallis in 1585 Bird became sole patentee. His first work of importance was 'Psalms, Sonnets, and Songs of Sadness and Piety, Made into Music of Five Parts' (1588). In 1589 he published a collection of songs, and also a collection of sacred pieces for five voices; a second collection of similar pieces appeared also in 1591. In 1607 he published two books of 'Gradualia,' being a collection of motets for the ecclesiastical year of the Roman Catholic Church; and in 1611 'Psalms, Songs, and Sonnets.' He continued all his life a Roman Catholic, but notwithstanding this held a lease from the Crown of lands confiscated from a Roman Catholic recusant, and never lost the appointment which he held in the Protestant Chapel Royal. Bird was the composer of the first English madrigal. He wrote a large number of pieces for the virginals, and also three masses. He was the author of a celebrated canon, 'Non nobis, Domine,' often sung in England by way of grace after meat at public banquets, and which has never ceased to be popular.

Bird-catching. See TRAPPING.

Bird-catching Spider, a name applied to gigantic spiders of the genera *Mygale* and *Epeira*, which catch birds and suck their blood. The species to which the name was originally given was *Mygale avicularia*, a native of Suri-

nam and other parts of tropical South America. The body of this insect is about two inches long, very hairy, and almost black; when the legs are stretched out it measures about a foot across. It lives in holes or crevices and does not spin a net proper, but makes a tubular nest for itself in which it lurks during the day, seeking its prey by night. Other species of *Mygale* belong to the Malay Archipelago, as *M. javanica* and *M. sumatrensis*. In experiments made with these spiders small birds have been known to die in a few seconds after being bitten. Some of the web-spinning spiders make webs strong enough to entangle small birds, which thus become their prey.

Bird-cherry, in America, the wild, red, pin, or pigeon cherry (*Prunus pensylvanica*) of the natural order *Rosaceae*, a tree 20 to 40 feet high of little use except occasionally for ornamental purposes, as fuel and as a stock for grafting garden cherries upon. Its red, thin-fleshed fruit is sour and somewhat astringent. The name is also given to European, the haggery of Scotland (*Prunus padus*), whose many varieties are often cultivated for ornament. It sometimes attains a height of 20 feet, bears racemes of flowers larger and a week earlier than the choke-cherry (*Prunus virginiana*), which it somewhat resembles. The fruit, which is black, is smaller than the common cherry and has a disagreeable taste, but is greedily eaten by birds. The wood, which resembles mahogany, and takes a good polish, is used in cabinet-making.

Bird-lice, minute wingless insects parasitic under the feathers of birds and hair of certain mammals, to which they are very annoying. They belong to the sub-order *Mallophaga*, a group of wingless degraded insects allied to the death-tick (*Psocidae*), stone-flies (*Perilidae*), and the white ants, altogether constituting the order *Platyptera*. They differ from true lice in having free jaws adapted for biting, and not a sucking beak. The flattened body is corneous, hard above, and the head is horizontal, with three- to five-jointed antennæ; the eyes are small and simple; the mandibles are small, like a hook, and the maxillary palpi, when present, for they are sometimes wanting, are four-jointed, while the labial palpi are two-jointed. The thorax is small and but two-jointed apparently, as the meso- and meta-thorax are united. The abdomen is from nine- to ten-jointed, while the short, thick limbs have two-jointed tarsi and one or two claws.

Bird-lime, a viscous substance used for entangling small birds so as to make them easily caught, twigs being for this purpose smeared with it at places where the birds resort or to which they are attracted by a call-bird. It is often prepared from the middle bark of the holly, which is stripped off in June or July, boiled in water for six or eight hours, and the water being strained off, is then left to ferment. This process may take two or three weeks, during which it is watered if necessary. At the end of this time it assumes a mucilaginous form, and after being pounded in a mortar and worked with the hands in water, is fit for use. This substance, when prepared, is of a greenish color and very tenacious. Mice are sometimes caught with it as well as birds.

BIRD-TICK — BIRDS

Bird-tick, one of the horse-tick or forest-fly family (*Hippoboscidae*) of the order *Diptera*. Like the horse-tick the body is much flattened; unlike the *Hippobosca*, or horse-tick, it has ocelli, but in the short proboscis it resembles the latter fly. In the wings there are six costal veins. There are numerous species, all of which are bird-parasites. *Olfersia americana* lives on the owl and other birds. Certain species of *Lipoptera* live on birds, but afterward migrate to mammals, finally losing their wings through disuse.

Bird of Paradise Flower. See *STRELITZIA*.

Birds. The birds form that class (*Aves*) of warm-blooded vertebrate animals most distinctive, most easily defined, and most popularly known and interesting. They are at once distinguished by their covering of feathers, which is possessed by no other sort of animal; and by the modification of their fore-limbs into instruments for flight (wings). Their aerial existence, from which few have wholly departed, requiring great activity and exertion, has called forth a high perfection of organization, especially in the respiratory and circulatory systems of the body, and has led to the characteristic spindle-shaped form, narrowing from the full chest and shoulders toward a pointed head, which will cleave the air easily, and diminishing toward the rudder-like tail. The graceful form, to which the beauty of birds is largely due, has been brought about by the enlargement of the shoulder-girdle, and its great pectoral muscles, and by the necessity of an increased capacity of chest to contain the comparatively great heart and lungs. In birds such as ostriches, cassowaries, moas, and the like, which have ceased to fly, and have developed very strong legs; or in those like the penguins, which have become swimmers and divers, the changes of structure are degenerations from the type, which is a bird with powers of flight.

Flight, as well as clothing, is due to the presence of the complicated horny appendages growing from the skin, called feathers, which are peculiar to the class. Their structure is described under **FEATHERS**. Those of the body are usually small, grow in certain definite tracts (see **PTERYLOGRAPHY**), varying in the different groups, and form a close jacket, not easily pervious to moisture and a poor conductor of heat, thus conserving the vital warmth and protecting the body against sudden changes of temperature. It is shed (molted) and renewed semi-annually. This body-coat is ordinarily nearly uniform in length and character, but often is varied by ornamental plumes, erectile crests, ruffs, and other modifications, such as are seen in birds of paradise, herons, and many others. The feathers are also variously colored in patterns varying with the groups and more minutely with the species, whereby they may recognize each other and be distinguished by us. These colors are usually those of pigments incorporated in the web of the feather itself, but may be due to minute scales on the surface, which break up the light, giving it an iridescent or metallic sheen, conspicuous in humming birds and certain pheasants. The plumage often varies, according to age, sex, season, or all three conditions; and these colors play an important part in bird-life (see **COLORA-**

TION PROTECTIVE; NATURAL SELECTION). The bones of the wing and tail support very large, strong "quill" feathers, which, when outspread, support the bird in the air, and when moved in the proper manner carry it forward—enable it to fly, the mechanism and phenomena of which method of locomotion are explained under **FLIGHT**. The wing power of most birds is very great, but the speed of their flight is often exaggerated. Few exact facts are at hand, but it is apparent that the highest speed is nearer 50 than 100 miles an hour, although the latter figure is often stated. Endurance on the wing is more remarkable. Many sea-birds seem tireless, and swallows, among land birds, are almost incessantly in the air. During migrations a large variety of birds, including some of the smallest and feeblest, undertake rapid and extensive journeys, reaching in some cases almost half around the world; and some regularly pass over spaces of ocean as much as 2,000 miles in width, while a flight of 500 miles from land to land is accomplished by many species. This is the more notable as a feat because in many cases they are birds which during nine tenths of the year only flit from bush to bush. In these migratory journeys (see **MIGRATION**) birds often fly very high; but this is the regular custom of certain ones, especially vultures, which soar beyond human sight, yet will swoop to the earth in a swift dash, betraying great adaptability to sudden changes in atmospheric density. Other notable qualities are the power (largely residing in the tail) to suddenly change speed and direction, helping them to dodge and elude winged pursuers, and to catch the agile aerial insects, upon which many of the smaller species depend for subsistence. The sharpness and quick adjustability of eyesight also involved in this is noteworthy.

These abilities in flight have led to the very wide distribution of birds, which occur in every part of the world yet seen by man; and are the most numerously represented of all terrestrial branches of animal life in the oceanic islands. Nevertheless very few are cosmopolitan, and not many range beyond the confines of a single continent, while many are more narrowly restricted, so far at least as their habitat in the breeding season is concerned. Thus the geographical distribution of birds has been found perhaps the best criterion for the mapping out of zoogeographical regions (see **ZOOGEOGRAPHY**). The greater number of families of birds is tropical, and both variety of kinds and numbers of individuals decrease toward the poles. A striking fact is the great difference between the birds of the northern and the southern hemispheres—a difference much more decided than exists between Europe and North America, or South America and Australasia.

Birds in every case reproduce their kind by means of eggs protected by a calcareous, often highly-colored shell, laid by the mother a considerable time before they are ready to hatch, which consummation is brought about by the application of warmth. This may be arranged for in two ways. A few birds bury their eggs in rotting vegetation, or in hot sand, and let the chemical heat evolved by the ferment in the former case, or the sun's rays in the latter, accomplish the desired result. The great majority, however, place their eggs in some sort of a receptacle (sometimes a mere hollow on

BIRDS

the ground, or hole or niche in a cliff or tree, sometimes in a burrow or nest of more or less elaborate construction (see NESTS), and there brood upon, or "incubate" them until the chick matures and emerges. In one class of birds (*Præcoces*) incubation is so long continued, and the embryonic chick becomes so far advanced before leaving the shell, that it is well coated with feathers, and can at once begin to take care of itself. These birds are the sea-birds, water-birds, game-birds, and their allies of comparatively low organization. In another class (*Altrices*) of higher organization as a group, the chicks are permitted to break from the shell before they have acquired feathers or are able to move about or obtain food. They must therefore be shielded, defended, fed, and cared for by the parents for several days or weeks. Out of this condition have grown some of the most interesting, complicated, and delightful features, habits, and instincts of bird-life.

Birds as a class are omnivorous, but each of the various groups might be characterized by its food, which, more than anything else in the process of evolution, has determined the various types of structure, which distinguish the tribes, and which are indexed, as it were, by the form of the bill and feet. Those of lowest organization,—nearest the ancestral type,—are the sea-birds, which live upon fish varied to some extent by mussels and other small marine creatures. Many of the ducks and shore-birds share this marine diet, and numerous wading birds eat fresh-water fish, frogs, crayfish, and the like. The great body of ratite and gallinaceous birds,—ostriches, emeus, partridges, pheasants, etc., that run and nest on the ground,—are vegetable-eaters, seeking green leaves, fruits, seeds, lichens, etc., and picking up such insects as come in their way. All the foregoing are præcocial birds, and the young feed on the same things as their parents. These classes have little relation to mankind so far as their food is concerned except that they sometimes devour too much grain or spoil certain plants. Among the higher class, or altricial birds, the fare is more varied, and while there is a very numerous group (the cone-billed or fringilline birds; see FINCH; SPARROW, etc.), which live altogether upon seeds, and a few others, like the kingfishers, which catch fish, the great majority indulge themselves in a miscellaneous diet of both vegetable and animal materials. Some, called "soft-billed," and including most of our song-birds, except the finches, are mainly insect eaters, some catching them upon the wing, others digging them out of rotten wood, and the greater number picking them off the leaves of trees or searching for them among the herbage. Another large class, embracing the birds of prey, and a few others, like the shrikes, depend for food upon capturing and devouring other smaller birds, together with such small mammals, reptiles, amphibians, fish, and insects as they are able to seize and kill. These are the falcons, owls, and their relatives; but a related group varies this fare by feeding upon carrion. In the case of all of these altricial birds, however, except the birds of prey, the young are fed upon soft insect food, mainly worms, caterpillars and maggots; and the period of their nesting coincides with the time when these larval insects abound. In the feeding habits of these

higher birds man has a great interest, for nearly all of the innumerable insects which they capture for themselves, or for the nourishment of their young, are such as are annoying or injurious to him; and experience in many localities has shown that the destruction of bird-life is accompanied by a distressing increase of noxious insects. In the same way the hawks and owls, by their incessant pursuit of mice, and other small animals injurious to agriculture, so reduce the numbers of these pests, as greatly to benefit the farmer; while the useful work done by the vultures, as scavengers, by removing offal and dead animals, is recognized by everyone in the tropical regions where these birds most abound.

Nor does the relative usefulness of birds to man stop here. They not only afford him great pleasure, by their pleasing colors and animated behavior, and delight his ear by their voices, but large numbers of them furnish him with excellent and even dainty food. Lastly, this group has furnished men with several varieties of domestic poultry, such as the turkey, peacock, guinea-fowl, duck, goose, and various pigeons and chickens, which are among the most valuable of his animal possessions.

Birds are extremely rare as fossils, compared with other vertebrates, and little is known about their evolution. Four or five hundred extinct species have been described, as against 12,000 living, and most of them are from very fragmentary remains. The reasons for their scarcity is partly their small size and the slight construction of their skeletons, which makes their bones less likely to be buried in sediments and preserved as fossils. At a few localities, however, as in the Oligocene strata of the department of Allier in France, and the Pleistocene deposits of Fossil Lake in Oregon, they occur abundantly. Birds have been found as far back in geological time as the Jurassic Period of the Age of Reptiles. The supposed bird-tracks of the more ancient Triassic sandstones of the Connecticut valley are now believed to be mostly, if not all, tracks of Dinosaurs (q.v.), a group of reptiles having many bird-like characters. From some ancient offshoot of this group the birds are probably descended, but the early stages of their evolution are not known. Jurassic birds (see *ARCHÆOPTERYX*) had teeth instead of a horny beak, a long reptilian tail and other primitive characters. In the succeeding Cretaceous Period the tail has become short and rudimentary, with its feathers springing from a small bony plate at its tip as in modern birds, but some genera (*Ichthyornis*, etc.) retain the teeth. In all later birds the teeth are replaced by a horny beak. They appear to have changed comparatively little during the Tertiary and Quaternary Periods, in marked contrast to the great evolution of the mammals during the same time, and most Tertiary birds are closely related to, or included in modern genera. There are a few remarkable extinct forms known, among which are the gigantic ground-birds of New Zealand, Madagascar, and elsewhere, more or less nearly related to the modern ostriches and the *Phororhachos* of South America.

References to books upon birds will be found under the title ORNITHOLOGY, where also the structure, and classification of birds are considered.

ERNEST INGERSOLL,

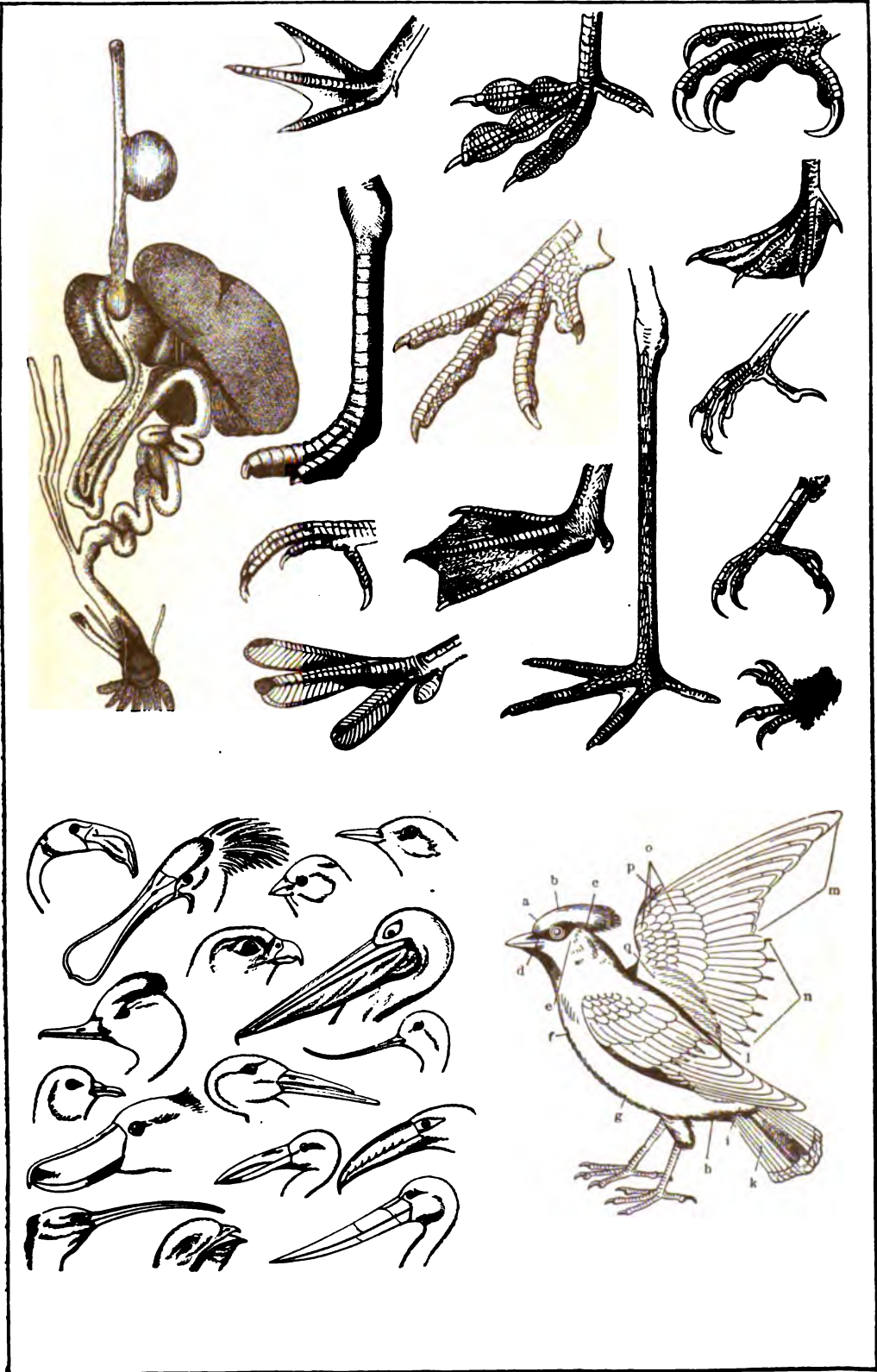
Editorial Staff 'Encyclopedia Americana.'

FAMILIAR AMERICAN BIRDS



1. Yellow-bellied Woodpecker, or Sapsucker. 2. Black-capped Titmouse, or Chickadee. 3. Black-and-White Creeping-Warbler. 4. Wood Thrush. 5. Cedar Waxwing, or Cherry Bird. 6. Black-billed Cuckoo. 7. Tree, or Canada Sparrow. 8. Red-eyed Vireo. 9. Golden-crowned Kinglet. 10. Little Screech-owl (red phase). 11. American Redstart.

PARTS OF BIRDS.



1. DIGESTIVE ORGANS.

2. FORMS OF FEET.—a, partially webbed; b, lobe-foot; c, insessorial foot; d, runner's foot; e, walker's foot; f, palmated foot; g, gressorial foot; h, web foot; i, cloven foot; j, scansorial or yoke foot; k, cloven web foot; l, staff-foot; m, cramp foot.

g, avocet; h, saw-bill; i, scissor-bill; j, dove; k, shoe bill; l, gap bill; m, arassari; n, ibis; o, song-bird; p, stork.

4. FEATHERS OF A BIRD.—a, frontal; b, crown; c, occipital; d, bill; e, cheek; f, breast; g, abdominal; h, rump; i, croup; j and k, sickle feathers; l, back; m,

BIRDS—BIRDS OF PARADISE

Birds, The, a comedy by the Greek dramatist Aristophanes, that appeared in 414 B.C. It belongs with the writer's earlier plays, in which farcical situations, exuberant imagination, and a linguistic revel, are to be noted. The comedy is a burlesque on the national mythology; the author creates a cloudland for his fancy to sport in without restraint.

Birds of America, The, the monumental work of John James Audubon, the great American naturalist, first published in England between the years 1827 and 1830. It contained colored illustrations of 1,065 species of birds. The text is descriptive of the habits and manners of the birds observed by Audubon himself in his long wanderings over the North American continent.

Bird's-eye Limestone, the old name of a rock of the Trenton formation, now called Lowville Limestone. It is a fine-grained, dove-colored stone, in which the crystallized corals of the genus *Tetradium* appear as whitish points.

Bird's-foot, (*Ornithopus*), a genus of about seven species of small slender pinnate-leaved, white, pink, or yellow flowered annual herbs of the natural order *Leguminosae*. The common and generic names were suggested by the shape of the articulated, cylindrical pods which resemble the bent claws of a bird. The principal species, *O. sativus*, is used as a forage plant.

Birds' Nests. See NESTS.

Birds' Nests, Edible, the nests of the salangane (*Collocalia fuciphaga*) and other species of swifts or swiftlets, found in the Malay Archipelago, and used as an article of luxury among the Chinese. They are particularly abundant in Sumatra and Borneo, especially near the north end of the island. The nest has the shape of a common swallow's nest, is about the size of a half teacup, is found in caves, particularly in sea-cliffs, and has the appearance of fibrous gelatine or isinglass. They appear to be composed of a mucilaginous substance secreted by special glands, and are not, as was formerly thought, made from a glutinous marine fungus or seaweed. The finest nests at present are said to bring as high a price as \$12 or \$13 a pound. It is said that \$75,000 or \$100,000 worth is sent to Singapore and China annually. They are bought almost exclusively by the rich Chinese, who consider them a great stimulant and tonic, and are used in making soup. The finest are those obtained before the nest has been contaminated by the young birds; they are pure white, and are comparatively scarce. The inferior ones are dark, streaked with blood, or mixed with feathers; they are chiefly converted into glue. Some of the caverns in which these nests are built are difficult of access and dangerous to climb, so that none can collect the nests but persons brought up to the trade. The following account of the traffic in these birds' nests is extracted from Crawford's excellent work on the Eastern Archipelago: "The best nests are those obtained in deep, damp caves, and such as are taken before the birds have laid their eggs. . . . They are taken twice a year, and if regularly collected, and no unusual injury be offered to the caverns, will produce very equally, the quantity being very little, if at all, improved by

the caves being left altogether unmolested for a year or two. Some of the caverns are extremely difficult of access, and the nests can only be collected by persons accustomed from their youth to the office. The most remarkable and productive caves in Java, of which I superintended a moiety of the collection for several years, are those of Karang-bolang, in the province of Baglen, on the southern coast of the island. Here the caves are only to be approached by a perpendicular descent of many hundred feet by ladders of bamboo and rattan over a sea rolling violently against the rocks. When the mouth of the cavern is attained, the perilous office of taking the nests must often be performed with torchlight, by penetrating into recesses of the rock, where the slightest trip would be instantly fatal to the adventurers, who see nothing below them but the turbulent surf making its way into the chasms of the rock. The only preparation which the birds' nests undergo is that of simple drying, without direct exposure to the sun, after which they are packed in small boxes, usually of half a picul . . . They are consumed only by the great; and indeed the best part is sent to the capital for the consumption of the court. The sensual Chinese use them under the imagination that they are powerfully stimulating and tonic; but it is probable that their most valuable quality is their being perfectly harmless. The people of Japan, who so much resemble the Chinese in many of their habits, have no taste for the edible nests; and how the latter acquired a taste for this foreign commodity is no less singular than their persevering in it."

Birds of Passage, any migratory birds. See MIGRATION.

Birds of Paradise, a family of birds of New Guinea, northern Australia, and the neighboring islands, which contains a large number of species, notable for splendid plumage, although they are most nearly allied to the plainly dressed crows. The name "bird of paradise" is a translation of the native name in the Island of Batchian, "mamukdewata," meaning birds of the gods. About 50 species of these birds are known, varying in size from that of a crow to that of a sparrow; all are forest birds, spending their lives in the tree-tops, where many of them go about in small flocks, active and noisy, but are inclined to hide themselves in the thickest foliage, as though aware that their plumage rendered them easily conspicuous to their enemies. None are singers, and in most cases the voice is a loud, harsh cry, or a sharp whistle, or in some species, strange mewing notes. It is related that on some of the islands certain species were called "birds of the sun," because of their habit of joining in loud choruses at sunrise. Their diet consists mainly of fruit, and especially of berries and seeds; the fig and the nutmeg are especially eaten, and some species suck honey from the large tropical flowers. Insects are captured by all species, as also are the numerous snails inhabiting the trees and bushes of that region, and the larger forms devour frogs and lizards. In pursuit of insects, worms, and snails, several species spend much of their time scrambling about the trunks of trees, and searching the bark like creepers. The breeding habits of these birds vary extensively, and the nests and eggs of many have not

BIRDS OF PARADISE

yet been discovered. The typical paradise-birds construct rather loose, careless platforms of sticks and leaves, moss, etc., placed in trees or bushes, and lay eggs which are much streaked and spotted, and vary in color and patterns. The very extraordinary nests and play-grounds of that section of the family which is terrestrial, and inhabits Australia, are described under bower-birds (q.v.).

Interest in the birds of paradise centres in their marvelous displays of plumage. These are exhibited in most species by the male alone, the female being comparatively plain and simple in her attire, as also are the young of both sexes, until the young males arrive at maturity. This dissimilarity between the females and males of birds in which the latter are highly adorned, is a protective arrangement, designed to keep the females from observation while they are sitting defenseless upon their nests, where they would easily be discovered, and often killed, did they wear the conspicuous colors and ornaments of their brilliant mates. Natural selection, by keeping their colors, and those of the inexperienced and comparatively helpless young ones plain, has tended to preserve the species; and at the time when the females are brooding their mates remain at a discreet distance from the nests, so as not to betray their position to the monkeys, lemurs, civets, serpents, and other searchers for eggs and fledglings. The same influence, acting through sexual selection (q.v.), has developed in the males the bright colors and eccentric adornments which distinguish this group of birds as a means of increasing their attractiveness in the eyes of the females. The theory is that the most beautiful male will be chosen first as a mate, and will transmit to its offspring its tendency toward ornamentation or high color, and that thus, by constant rivalry between the males, the excessive ornamentation in this group has slowly arisen. A justification for this view is found in the fact that in the courting season, which occurs at the opening of the rainy season, numbers of males of each species gather in certain spots, sometimes on the ground, but more usually on the limbs of the forest trees, and go through a great variety of movements and strange antics, lifting their wings, spreading their tails, erecting their crests, and apparently doing everything in their power to display their finery in the eyes of the females, and thus solicit them to make a choice. Natives call these assemblages, which usually occur at sunrise, and always in the same place, "dancing parties," and it is during this time that they secure specimens for the trade, by shooting them from ambush with blunt arrows. So persistent has been the demand for their skins and feathers, chiefly for millinery purposes, that many of the species have been nearly exterminated. This may easily occur from the fact that the range of most of the birds of paradise is very limited, several species being confined to a single island. Their increase, too, is slow, as most of them lay only two or three eggs, a condition which has arisen from the fact that their natural enemies are comparatively few. They have occasionally been captured alive, and kept for a time in captivity, even in the zoological gardens of Europe, but they do not thrive in confinement. The best-known of the birds of paradise, is the great emerald paradise bird (*Paradeisea apoda*) of the Moluccas which was brought to Europe

first in 1523, by the members of Magellan's company, on their return from the first circumnavigation of the world. They brought two dead specimens which had been given to them in the island of Batchian as a mark of royal favor. From these skins the natives, as was their custom, had cut off both the wings, and the feet; and this gave rise to the absurd stories of the early books, that the paradise birds were naturally footless and wingless, never perched, suspended themselves by the tail-feathers, etc. It was also said that they gazed perpetually at the sun, and that the hen laid her eggs on the back of her spouse. This species is as large as a crow. The male is rich brown, becoming purplish beneath; the head and neck are pale yellow, the forehead, cheeks, and throat, metallic green. From the sides of the body, beneath the wings, spring thick tufts of delicate, loosely-webbed, golden-orange feathers, which, when the wings are lifted, may be lifted and spread out so as to seem to fall like a shower over the whole bird; and the two middle tail-feathers are like long wires, each with a very slight flag-like web at the tip. It would be impossible to describe at length the great variety and splendor of the plumage of these eccentrically ornate birds, only a few of which may be further alluded to. In the red bird of paradise (*Paradeisea sanguinea*) the plumage is like velvet in a variety of gorgeous colors, and the tufts at the sides are rich crimson, while the elegantly curling central tail-shafts are 21 inches in length. A genus of New Guinea (*Cincinnurus*) includes a number of species, only about six inches long, called the king birds of paradise, which are distinguished by large tufts of fan-like plumes on each side of the breast. Another genus (*Parotia*) has as its especial ornament a group of three long feathers springing from behind each eye, which are in the form of metallic wires, with a racket-like web at the end that may be erected and moved about as the bird wishes. Otherwise the plumage is black, except for some vivid steel-green and white feathers about the head. Some species have a distinct shield of metallic, scale-like feathers, upon the back or upon the breast, which may be glossy blue, or green, or violet, or glowing scarlet, or a mixture of these. The acme of this strange and gorgeous development in plumage seems to be attained by the "superb" bird of paradise (*Lophorhina superba*), which is characterized by the presence of an enormous erectile forked shield of velvety black feathers arising from the nape of the neck, and when in repose lying flatly on the back. So strange and apparently incongruous is this shield, that it might suggest to the beholder that the tail of some other bird had been stuck on to the skin, were it not that its feathers are of a different type. The ground-color of the plumage is of the deepest black, but with bronze reflections on the neck; while the feathers of the head are metallic green and blue. Spreading over the breast is a shield composed of narrow and rather stiff feathers, which extends in a pointed form, along each side, and is emarginate in the middle. In color, this is bluish-green, with a satiny sheen; the back shield, on the other hand, is velvety black, with reflections of bronze and purple, its outermost feathers exceeding the primaries of the wing in length. The natives say that the enormous crest, when displayed during the courtship

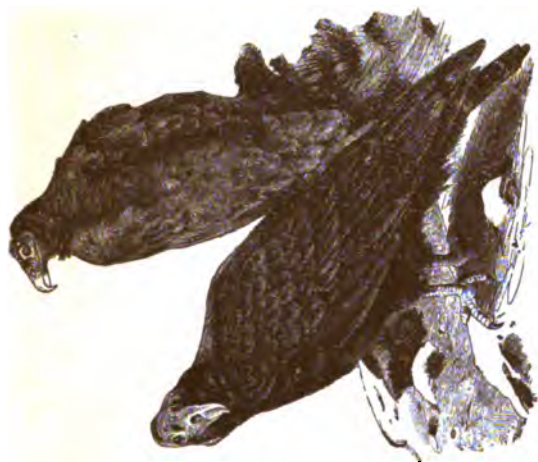
BIRDS OF PREY.



1.



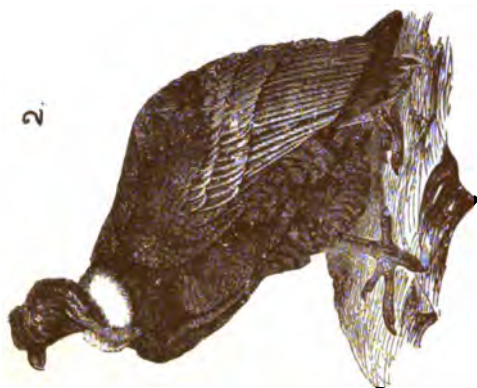
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3.



2.



5.

1. The Carrion Crow (*Catharista atrata*).
2. The King Vulture (*Sarcorhamphus papa*).
3. The Turkey Buzzard (*Catharista aura*).
4. The Pileated Vulture (*Neophron pileatus*).
5. The Condor (*Sarcorhamphus gryphus*).

BIRDS OF PREY.



1. Hobby (*Falco subbuteo*).

2. Ruppell's African Vulture (*Gyps Ruppelli*).

3. Carancho (*Polyborus Brasiliensis*).

4. Common Buzzard (*Buteo vulgaris*).

5. Sparrow Hawk (*Accipiter Nisus*).

6. Bataleur Eagle (*Helotarsus ecaudatus*).

7. South American Buzzard-Hawk (*Asturina polyzona*).

8. East Indian Pigeon-Hawk or Turumti (*Falco chiquera*).

BIRDS OF PREY.—BIRETTA

of the female, is not only raised, but spread widely out, in a fan-like manner, while the chest shield is similarly expanded. Hence the head of the bird forms a circle of irregular feathers of velvety black and emerald, completely concealing the rest of the body when viewed from the front.

General information as to the birds of paradise will be found in books of East Indian travel, especially in 'The Malay Archipelago' (1869), by Alfred Russel Wallace, the first naturalist to study these birds attentively in their native haunts. As early as 1873, Daniel Elliot completed a magnificent monograph of the family, illustrated with colored folio plates, and in 1881 was published a second monograph, by Salvadori, as a part of his general work on the ornithology of the Papuan region. Still more recently German naturalists have increased our knowledge of this family by many papers in German scientific periodicals, which have been utilized by Rothschild in the preparation of his account of these birds in 'Das Tier-reich' (Berlin 1898). The most recent sketches are those of the 'Royal Natural History' (Lond. 1895), and Evans, 'Birds' (Lond. 1900).

Birds of Prey. This group is a survival of the old-fashioned classification of animals by resemblances in appearance and function, rather than in structure. Broadly speaking, a bird of prey is merely one which subsists by attacking and devouring living creatures, and hence the name covers such birds as skuas, frigate-birds, shrikes, and fish-catching birds, as well as the eagles, hawks, and owls, to which it is restricted by popular usage. In all these cases the adaptations are for a predatory life, especially marked in the strong seizing talons of the hawks and owls, and in their hooked, sharp-edged beaks, suitable for tearing and cutting, along with which go suitable modifications of the digestive organs, characteristic of the accipiters. These adaptations bear a curious, yet natural likeness to the claws, teeth, etc., of carnivorous mammals and reptiles.

Birdsall, William W. American educator: b. Richmond, Ind., 1854; d. Phila., Pa., 17 March 1909. He was graduated from Earlham College, Indiana, 1873, and was a teacher in large secondary schools until 1898. He was president of Swarthmore College, Pennsylvania, 1898-1902.

Birdwood, Herbert Mills, English lawyer: b. Belgaum, Bombay Presidency, 29 May 1837. He was educated at Edinburgh University, and was dean of arts (1868, 1881, 1888, 1890) and syndic at the Bombay University, and vice-chancellor 1891-2. He entered the Bombay civil service 1858; was made assistant collector and magistrate 1859; assistant judge 1862; under secretary to the government, judicial, political, and educational departments, and secretary of the legislative council 1863; acting registrar of the high court, Bombay 1867; district judge for Ratnagiri, Surat, and Thana 1871-80; judicial commissioner and judge of the sadar court, Sind 1881; three times acting judge of the high court, Bombay 1881-5; puisne judge of the high court of Bombay 1885-92; and member of the executive council of the governor of Bombay 1892-7. His publications include 'Catalogue of the Flora of Matheran and Mahableshwar'; 'Catalogue of Bills Introduced

into the Bombay Legislative Council in 1862-5'; and papers relating to the constitution of the council, the plague in Bombay, etc.

Bireme, a Roman ship of war with two banks of oars. It was inferior, in magnitude and strength, to the trireme.

Biren, bē-rōn, or Biron, Ernest John von (DUKE OF COURLAND), Russian statesman (grandson of a groom of James, Duke of Courland, and the son of a Courland proprietor of the name of Bühren): b. 1687; d. 28 Dec. 1772. He studied at Königsberg, secured the favor of Anna, Duchess of Courland, and niece of Peter the Great of Russia; but he was unsuccessful in his attempt to obtain admission among the Courland nobility. When, in 1730, Anna ascended the Russian throne Biren was loaded by her with honors and introduced at the Russian court. Here he assumed the name and arms of the Dukes of Biron in France. Fierce and haughty by nature, he indulged his hatred against the rivals of his ambition. The Princes Dolgorucky were his first victims. He caused 11,000 persons to be put to death, and double that number to be exiled. It is said that the empress often threw herself at his feet to induce him to lay aside his severity, but that neither her entreaties nor her tears were able to move him. The firmness of his character, however, introduced vigor and activity into all branches of the administration throughout the empire. In 1737 Anna forced the Courlanders to choose her favorite (who had in 1722 married a Courland lady) for their Duke. After declaring Prince Ivan her successor, she appointed Biren regent. Anna died 28 Oct. 1740. The new regent acted with prudence and moderation. But a secret conspiracy was soon formed against him. Field Marshal Münnich caused him to be arrested in his bed during the night of 19 Nov. 1740, and to be confined in the castle of Schlüsselburg. He was subjected to a trial; but the sentence of death was changed into that of imprisonment for life, and his fortune was declared confiscated. Together with his family he was transported to Pelym, in Siberia, and thrown into a prison, of which Münnich himself had furnished the plan. In the following year Elizabeth, daughter of Peter the Great, being raised to the Russian throne by a new revolution, Biren was recalled 20 Dec. 1741, and Münnich was obliged to occupy his prison. At Kasan the sledges met; the travelers recognized each other, and proceeded on their way without interchanging a word. Biren was detained at Jaroslav, and only received his full liberty in 1762 from Peter III. When Catherine II. ascended the throne the Duchy of Courland was restored to Biren in 1763. He governed with wisdom and lenity, transferring the government to his eldest son, Peter.

Biretta, a cap worn by ecclesiastics, especially those of the Roman Church, though some ritualistic clergymen of the Anglican Church also wear it. It is of considerable antiquity, though it has varied in shape and material at different times. It is at present a stiff-sided, square-shaped cap with sharp edges, a flattened top surmounted by ridges rising above it, having in the centre a sort of tuft or tassel. It is made of cloth or stuff, the color being black for priests, purple or violet for bishops, and scarlet for cardinals. See VESTMENTS.

BIRGE — BIRMINGHAM

Birge, Edward Asahel, American naturalist: b. Troy, N. Y., 7 Sept. 1851. He graduated at Williams College 1873; studied physiology and histology at Leipsic 1880-1; became instructor of natural history in the University of Wisconsin 1875; professor of zoology 1879; dean of the College of Letters and Science in 1891; and acting president of the university 1900-1. In 1894 he became director of the Geological and Natural History Survey of Wisconsin. He has written many articles and papers on zoology.

Birge, Henry Warner, American soldier: b. Hartford, Conn., 25 Aug. 1825; d. New York, 1 June 1888. At the outbreak of the Civil War he organized the 4th regiment Connecticut Volunteers, and was commissioned its major 23 May 1861. In November 1861 his uncle, Gov. Buckingham of Connecticut, appointed him colonel of the 13th Connecticut Volunteers, which joined Butler's army at New Orleans. He took part in the siege of Vicksburg and the first Red River campaign; commanded a division in Grant's Virginia campaign; and was with Sheridan in the latter's most brilliant movements in the Shenandoah valley. In November 1865 he resigned with the rank of brevet major-general. His services were recognized by an appreciative vote of thanks from the legislature of Connecticut.

Birkbeck, George, originator of mechanics' institutes: b. Settle, Yorkshire, 10 Jan. 1776; d. 1 Dec. 1841. He studied medicine at Edinburgh and took the degree of M.D. in 1799, among his friends and fellow students being Brougham and Jeffrey. Being appointed to the chair of natural and experimental philosophy in the Andersonian University at Glasgow, in 1799, he delivered his first course of lectures. The following year he began to give gratuitous lectures to mechanics, which were soon largely attended. This was the first attempt to establish mechanics' institutes, and to Dr. Birkbeck the honor of being their founder belongs. The Glasgow Mechanics' Institution, though not established till 1823, owed its origin to these lectures delivered by him. In 1804 he settled as a physician in London, and was soon engaged in an extensive practice; but the extension of scientific knowledge to mechanics was ever in his thoughts, and in 1824 he had the happiness of being elected president of the London Mechanics' Institution, for which that at Glasgow had led the way. Similar institutions soon arose and prospered in all the larger towns of the kingdom. Dr. Birkbeck was also connected with the founding of University College, London, advocated the repeal of the tax on newspapers, and was active as a lecturer and promoter of various educational movements. The London Mechanics' Institution still exists, but it is now known as the Birkbeck Literary and Scientific Institution.

Birkenhead, England, a parliamentary, county, and municipal borough of Cheshire, on the estuary of the Mersey, opposite Liverpool. Its growth has been rapid. It owes its prosperity to the same causes that have made Liverpool a great seaport, and may be regarded as a suburb of that city. Its docks have a lineal quay space of over nine miles, with a complete system of railway communication for the shipment of goods and direct coaling of steamers. It has a handsome square, a town-hall; sessions

court and police courts; market; modern slaughter-houses; public baths; and ranges of dwelling-houses for workmen, unusually complete in their accommodation and in all their appointments. The system of drainage and sewerage is very complete. There is a theological college of the Church of England (St. Aidan's); a free public library, schools of art, etc. The ruins of an ancient Benedictine priory founded in 1153 still exist in a good state of preservation. The ferry privileges were formerly vested in the monks of this priory. The benevolent institutions comprise an infirmary, children's and lying-in hospitals, and a dispensary. It has a large public park of 114 acres beautifully laid out, and another and smaller public park. Its magnificent docks and dock warehouses, however, which belong to the splendid Liverpool system, form the distinguishing feature of Birkenhead. The Mersey tunnel, $4\frac{1}{2}$ miles long, including the approaches, 21 feet high, and 26 feet wide, and which cost \$6,100,000, now connects Liverpool with Birkenhead. Communication with Liverpool is also kept up by steam ferries, the property of the corporation, which yield a handsome revenue. The corporation also owns the gas, water, and electric lighting plants, and the tramway lines, which were introduced here by George Francis Train, one of the earliest systems in Great Britain. The water-supply, which is abundant and of excellent quality, is obtained within the borough by pumping from the red sandstone strata which underlies it. Birkenhead has gained a distinguished name for ship-building, the extensive yards of Laird Bros. (builders of the famous Confederate ship *Alabama*) being located here. There are machine and engineering works, wagon factories, flour-mills, oil-cake mills, etc. Birkenhead has returned a member to Parliament since 1861. It received a charter of incorporation as a municipal borough in 1877. Pop. about 113,000.

Bir'ket-el-Keroon' ("lake of the horn"), Egypt, a lake in the Fayoom, about 30 miles long and 6 miles wide. It communicates with the Nile and had connection formerly with the artificial Lake Moeris, with which it has been confounded.

Birkett, Herbert Stanley, Canadian physician: b. Hamilton, Ont., 17 July 1864. He graduated at McGill University in 1886; was senior house surgeon to the Montreal General Hospital 1886-7; and assistant physician to the Montreal Dispensary 1887-9. He is a Fellow of the American Laryngologist Association. In 1889 he was appointed demonstrator of anatomy at McGill University, and in 1900 was laryngologist to the Montreal General Hospital, and aurist to the Mackay Institute for Deaf Mutes.

Birmingham, Ala., "the Pittsburg of the South," the industrial head of the entire South between Atlanta and New Orleans, and the chief centre of the iron and coal industry south of Pennsylvania; county-seat of Jefferson County, in the northern centre, midway between the Coosa and Black Warrior rivers, 608 feet above the sea in a valley, near where the last Appalachian spurs sink to the coast plain; 96 miles north of Montgomery, the State capital, and 168 miles west of Atlanta, on six trunk roads: the Southern, L. & N., Kansas City, M. & B., Cen-

BIRMINGHAM

tral of G., Alabama G. S. (Queen & Crescent), and Seaboard A. L. R.R.'s. It is situated in the heart of the greatest coal, iron, and limestone district of the South. Around it lie three huge coal fields, the Warrior, Cahaba, and Coosa, aggregating over 8,610 square miles, with some 60 seams, more than half of them workable; the nearest deposits being only 4 miles from the city. Birmingham is built partly upon the slope of Red Mountain, named from its outcrop of hematite iron ore, which extends many miles in every direction from the city, in a vein from 6 to 26 feet thick with an indefinite depth. This district produced in 1909 about 90 per cent of the State's production of 13,703,450 tons of coal, 3,085,824 tons of coke, and 1,763,617 tons of pig iron. Six hundred thousand freight cars were handled in and out of Birmingham, carrying 70 per cent of the entire tonnage of Alabama in 1910, and also hauling about 1,000,000 tons of limestone. This ideal equipment for the production of iron and steel at the lowest cost, is building up a great city with such rapidity that no statistics can be other than temporary.

Business Interests.—It is estimated that there are in Jefferson County more than 300 mining and manufacturing plants of various kinds, among which are 27 blast furnaces, 7,168 coke ovens, 60 coal mines, a large number of mines and stone quarries, 2 steel plants, 3 rolling mills, a wire rod and nail mill, a steel rail mill, besides other plants of various kinds. There are in Jefferson County 50,000 wage-earners who receive more than \$2,750,000 per month. The gross volume of business in mining and manufacturing during the year 1910 was estimated at \$75,000,000, and the gross volume of business in the general wholesale and retail trade amounted to about \$60,000,000, making the total amount of business for the year 1910, \$135,000,000. After the census of 1904, Birmingham extended its corporate limits to six times the former area; that is, from 4,270 acres to 30,881 acres. Populous suburbs were added in which were manufacturing establishments. In 1909 the entire city contained 248 of these, the value of their products being \$24,128,000, capital \$23,718,000, salaries and wages paid \$5,828,000, and cost of materials \$14,010,000. They employed 8,999 wage-earners. This shows an increase of 313 per cent in the capital invested over that of 1904. Ten years before, Birmingham was already furnishing six sevenths of the total United States' export of pig iron, but since then none of the product has been exported on account of the increased home demand. The first steel plant in the South was started in 1897 at Birmingham, two open-hearth furnaces of 160 tons a day; now the Tennessee Coal, Iron & Railroad Company has in operation at Ensley, a suburb, 10 furnaces and a 44-inch blowing mill, capacity 1,000 tons a day. This is the largest basic open-hearth plant in the world except the Carnegie works at Homestead. There is a casting plant and rail mill in connection with it. The Alabama Steel and Shipbuilding Company began in 1899 with \$1,000,000 capital, and the Alabama Steel and Wire Company with \$2,000,000 capital. Besides the plants already mentioned, Birmingham has a steel casting plant, a bi-product plant, a wrought pipe plant, cast pipe and foundry plants, soil pipe plants, clay pipe plant, cement factories, chemical works, fertilizer factory, breweries,

corn mill, flour mill, ice factories, gas and gasoline engine works, iron and steel bridge works, boiler works, foundries and machine shops, stove foundry, railroad shops, sash factories, wagon factories, agricultural implement works, printing and bookbinding concerns, hollow ware plant, brick plants, planing mills and wood-working plants, and packing company. Birmingham is also a cotton market, the cotton receipts annually exceeding 100,000 bales. It has cotton factories, cotton-seed oil mills, and knitting factory. Besides the unparalleled cheapness of material, its transportation facilities are shortly to be greatly increased by the completion of the government improvements on the Warrior and Tombigbee rivers, by which coal and other products can be transported to tide water at Mobile, thence to the Atlantic seaboard, at greatly reduced cost.

Public Works and Institutions.—Birmingham is a handsome and solidly built city, with wide avenues, handsome dwellings, and imposing public buildings. It has a large government building, county court-house, new city hall, costing over \$200,000, and three new 10-story steel-frame "skyscrapers," one of them costing over \$600,000. Among the other notable buildings are the Jefferson Theatre, the Auditorium, St. Vincent's Hospital, Hillman's Hospital, Union Station, and Hillman Hotel. There are 16 or more public parks, the most prominent of which are the Capitol, North Birmingham, East Lake, and Lakeview. The city has an extensive waterworks system, with a reservoir on Shade's Mountain, 225 feet above the city, a Waring system of sewerage, and over 100 miles of street railroads, connecting it not only with its immediate suburbs, but with points many miles away. There are over 50 white churches, a public library, 11 hospitals and infirmaries, 13 public schools, 16 newspapers, including 3 dailies, 9 military organizations, 2 telephone companies, 13 private schools and colleges, including 1 medical college, 1 dental college, 2 business colleges, Howard College (Baptist, at East Lake, 5 miles northeast, founded 1841), Northern Alabama (Methodist) and a colored normal training school. Its charitable institutions comprise St. Vincent's Hospital, Hillman Hospital, Mercy Home, Jefferson County Alms House, and the Boys' Industrial School at East Lake.

Finances and Government.—The assessed valuation of the city property for 1910 was \$65,815,026, which is on about a 50 per cent basis; tax rate for 1910, State, county, and city, \$1.00; public outlay for 1902, including \$39,362.60 for public schools, \$463,489.69. In 1902, however, a special expenditure of \$229,856 was made for cement sidewalks, street improvements, and sewers. The government of the city is in the hands of a mayor and city council, elected biennially, and an elected police commission and a nominated board of education.

The rapid development of Birmingham's business is best shown by the infallible test of the clearing house, the only one in Alabama. In 1897 the exchanges amounted to \$20,907,495; in 1899, to \$34,469,751, and in 1909 to over \$101,500,000, having more than doubled in ten years. Part of this is due to the increasing use of the Birmingham banks by territory which formerly sought those of the other large cities. The Birmingham banks furnish funds for moving 125,000 bales of cotton. Their business

BIRMINGHAM

often exceeds \$1,000,000 a day. In 4 years, 1898-1902, their deposits increased from \$3,500,000 to \$9,251,820. There are many banking institutions in the city, with an aggregate capital exceeding \$3,000,000, well managed and prosperous institutions.

Population and History.—By the census, the population in 1880, the first after Birmingham's settlement, was 3,086; in 1890, 26,178; in 1900, 38,415. But these figures tell only part of the story and are very misleading. Birmingham is entirely the creation of the last 30 years. The future of the district was foreseen as early as 1849, but the first attempt to realize it was about 1870, by a company which bought a large tract of land around Elyton, then the county-seat, now a suburb of Birmingham, which sought to make that the centre of the new development. It failed because prices were too high, and another company bought a tract to the east, where stood a single shanty on the spot where the Florence Hotel now stands, which they named Birmingham. The next year a small iron furnace was erected and this started up coal mining. Coal had hitherto lacked a market, but in 1874, 50,400 tons were mined. The demand of the Oxmoor furnace for coal led, in 1879, to the opening of the Pratt mines, and with this began the era of great growth. The population leaped in the next decade from 3,000 to 26,000, a growth unparalleled in United States history, except by Chicago. Retarded for some years by the collapse of the boom, it still had grown 50 per cent by 1900. In fact, the increase was more than double that, for the nominal city is only the business hub of a large group of cities and towns, built up by the same interests and but little removed from each other, which will probably in the near future be annexed under the name Greater Birmingham, giving it a population of more than 200,000. The largest of these surrounding towns is Bessemer, 11 miles away; others are Ensley, Pratt City, Elyton, Gate City, Irondale, Powderly, West End, Smithfield, East Birmingham, North Birmingham, East Lake, Woodlawn, Kingston, Jonesville, and Avondale. When Birmingham was settled, it had 3,086 inhabitants; in 1910 it had 132,685, many surrounding precincts having been annexed in 1903 and 1910. The rapidity of the city's present growth is shown by the fact that in a single year 1,900 new dwellings and business buildings were erected, at a cost of over \$3,250,000. Birmingham has government by commission.

ROY McCULLOUGH,

Secretary Board of Trade.

Birmingham, England, one of the greatest manufacturing cities of the world, situated on the River Rea, near its confluence with the Tame, an affluent in the northwest extremity of the county of Warwick, 112 miles northwest of London, and nearly in the centre of England (north lat. 52° 28' 45", west long. 1° 54'). The lower part of the city, consisting chiefly of old houses, is crowded with workshops and warehouses, and inhabited principally by the working classes; but the upper part has some fine streets and buildings, and there are fine suburbs westward and southward of the city.

Public Buildings.—The town hall, built of

Anglesey marble in 1832, is a rectangular building, modeled after the temple of Jupiter Stator at Rome. Its large hall is 145 feet long, 65 feet wide, and 65 feet high, seating 2,250 persons, and contains a magnificent organ. In this hall a great musical festival is held once every three years the proceeds of which go to the General Hospital. It was at the Birmingham Festival that Mendelssohn's oratorio, 'Elijah,' was first performed (1846), and Gounod's 'Redemption' and Elgar's 'Dream of Gerontius' are among other famous works first heard at this festival. Among other public buildings of note are the council-house, for the accommodation of the different corporation offices, with fine reception rooms and council chamber, erected 1874-8 (cost \$1,000,000); the Victoria Law Courts, a fine edifice in terra cotta (Renaissance), (cost \$580,000); University buildings, municipal technical school, municipal schools of art and design, Bingley Hall (a large covered place holding 25,000 persons, wherein the late John Bright, W. E. Gladstone, and Joseph Chamberlain have addressed vast audiences), post-office, corporation baths, the stations of the L. & N. W., Midland, and Great Western R.R.'s, cavalry barracks, public libraries, the Exchange buildings, art gallery (special features, paintings by David Cox and by the Pre-Raphaelite school of artists, and valuable collections illustrative of industrial arts), Birmingham and Midland Institute, corn exchange, Masonic hall, markets, etc.

Monuments.—The public statues include those of Queen Victoria, Prince Albert, James Watt, Joseph Priestley, Lord Nelson, Sir Robert Peel, John Bright, Joseph Sturge, Thomas Attwood, George Dawson, Dr. R. W. Dale, Sir Josiah Mason, etc.

Churches, Hospitals, etc.—The mother church of Birmingham is that of Saint Martin's, or the Old Church (built about 1250, rebuilt 1875), the parish registers of which date from the year 1544; this church contains several altar tombs of the Birmingham family. Saint Philip's (recently constituted the cathedral church) was the second parish church, built 1711, palladian style, restored 1868; both churches contain fine stained-glass windows designed by Sir E. Burne Jones, a native of Birmingham. Among the more noteworthy non-anglican churches are the Roman Catholic Cathedral of Saint Chad, a noble Gothic church designed by Pugin, richly adorned with stained-glass windows, and with fine 16th century pulpit and stalls; the Oratory of S. Philip Neri (founded by Cardinal Newman); the old Meeting House of Carr's Lane (Congregational), associated with the labors of John Angell James and R. W. Dale; the Wesleyan Central Mission Hall, erected 1903, surmounted by a lofty Renaissance tower, and seating over 2,000 persons (cost \$300,000); the two Unitarian churches, "Old Meeting House" and "Church of the Messiah," the successors of the old meeting houses destroyed in the memorable riots of 1791. Among the charitable institutions the most important are the General Hospital (founded 1766, rebuilt on new site 1804-7, cost over \$1,000,000); the Queen's Hospital; Free Hospital for Sick Children; Women's Hospital; Ear and Throat Hospital; Orthopædic and

BIRMINGHAM

Spinal Hospital; Homœopathic Hospital; Skin and Lock Hospital; Dental Hospital; Eye Hospital; Jaffray Hospital for Convalescent patients, etc.

Educational Institutions.—The principal educational institutions are the Birmingham University, incorporated 1900, a growth of Mason University College, founded by Sir Josiah Mason in 1875 (and further endowed by public subscription with about \$2,000,000), which has faculties of arts, science, medicine, and commerce, and new buildings for the engineering, physics, and science sections generally are now (1907) in course of erection at a cost of over \$1,500,000; Roman Catholic College at Oscott; Wesleyan Theological College at Handsworth; Saltley diocesan training college; Free Grammar School founded by Edward VI. out of the endowments of the older Birmingham town gild, which has a central and five branch schools; Blue Coat School; Protestant Dissenting Charity School (for maintaining and educating poor girls for domestic service); the municipal schools of art and design, and technical schools; industrial schools, and numerous public elementary schools, mostly erected by the now defunct School Board, and maintained by the council under the Education act, 1902.

Libraries.—There is a central free library, having 170,000 volumes in its reference library, a Shakespeare Memorial Library (11,500 volumes), and eleven lending libraries, containing over 110,000 volumes; the Birmingham Library, an old proprietary library (established 1779), contains 80,000 volumes.

Parks, etc.—There are ten public parks and several recreation grounds, and the city owns two natural beauty-spots somewhat remote from its boundaries, viz. Rednal Hill (Lickey), and Warley Abbey estate. In Aston park (one of the oldest belonging to the city) is Aston Hall, a fine Jacobean residence built by Sir Thomas Holte in 1618, which was besieged in the civil war by the parliamentary forces, December 1643. Its chief features are the long gallery, one of the finest in England, and the great staircase, which was injured during the siege. The Hall is now a public museum.

Industries.—The prosperity of Birmingham is attributable to the excellence, variety, and extent of its hardware manufactures, as well as to its geographically central situation on the border of the great South Staffordshire coal and iron district, combined with the command of a wide and ready transit by canal and railway. There is an extensive system of tramways. At Soho, in the vicinity of the city, was the earliest and one of the largest steam-engine manufactories in the world, belonging to Boulton, partner of the celebrated James Watt. The Soho works were founded in 1757 and came into the possession of Matthew Boulton in 1762. Not a vestige of the building now remains. One of the most important manufactures is that of firearms. The number of gun-barrels tested in some recent years has been between 500,000 and 600,000. The manufacture of swords is also one of the staple trades. Cast-iron articles of all kinds, and of the most beautiful patterns and workmanship, are manufactured at Birmingham to a great extent. In former years iron-founding

was limited to large and heavy articles, but is now extended to the lightest and most graceful, in the finishing of which bronze is very generally employed. The manufacture of railway wagons and carriages has been very extensively developed. The quantity of solid gold and silver plate manufactured is large, and the consumption of silver in plating is very great. Electro-plating was first practised in this town in 1840. Japanning, brass-founding, glass manufacturing, and glass staining or painting, are important trades. There are also large chemical works for vitriol, sal-ammoniac, cobalt, and other substances. Steel pens, of which hundreds of millions are manufactured annually, pins, fancy seals, brooches, clasps, and other trinkets are made in immense quantities. Bicycles are now made in Birmingham in greater numbers than in any other town.

Government, etc.—The charter of incorporation dates from 1838. By the Reform Act of 1832, Birmingham was constituted a borough, sending two members to Parliament. The act of 1867 gave it a third, while that of 1885 added four others and divided the borough into seven parliamentary districts. In 1888 it was raised by order in council to the rank of a city, and by the Local Government Act of that year, it also became a county borough. A further order in council (1896) conferred upon the chief magistrate of the city the title of lord mayor. In 1891 the boundaries of the borough were extended, and its area is now 12,705 acres comprising the parishes of Birmingham and Edgbaston, and parts of others. The borough is divided into 18 wards, and has 18 aldermen and 54 councillors. The municipal and parliamentary boundaries are the same, the parliamentary divisions being North, South, East, West, Central, Bordesley, and Edgbaston. Water is now brought from the Elan Valley, Wales, a distance of 80 miles, at a cost of about \$30,000,000. The corporation of Birmingham has long been recognized as in the forefront of British municipalities, a reputation which it largely owes to the work done by the Right Hon. Joseph Chamberlain (three times mayor). The corporation purchased the gasworks and waterworks in 1875, and the Electric Company's rights in 1898. In 1876 an "Improvement Act" was obtained, by which at a cost of about \$10,000,000 a large area of insanitary property in the centre of the city was removed, and Corporation Street was laid out on the site thereof.

History, Populations, etc.—The city of Birmingham is supposed to have originated in a Saxon settlement formed in a clearing in the great central forest of England, the forest of Arden, near to the Icknield Street, a Roman road of which an original portion is still visible in Sutton park. It was the home of the Bermings—the young, or progeny of Berm, from whence the name is derived. It was a place of comparatively small importance at the Conquest, although it is mentioned in Domesday Book (1086) where it is called Bermingham, a name of which there were many corruptions, chiefly arising from the old pronunciation and from misspellings, wherefrom the popular local name "Brummagem" is derived. In the 14th century two gilds were founded, the more important of

BIRNAM—BIRNEY

which (the Gild of the Holy Cross) exercised functions akin to those of a municipal character, until the dissolution of the monasteries and religious houses. There was also a priory or hospital of Saint Thomas, and several chantries attached to the parish church, but all these were sequestered with the religious houses. Some of the revenues of the town gild were devoted by Edward VI. to the foundation of the Free Grammar School. Birmingham was visited in 1532 by John Leland, who wrote of it in his Itinerary as having "many smiths in the town, that make knives and all manner of cutting tools, loriners that make bits, and many naylors." Camden, in 1576, found it "swarming with inhabitants and echoing with the noise of hammers and hammers." In the civil war Birmingham suffered considerably at the hands of Prince Rupert and the royalists, who encountered the inhabitants in a fierce hand-to-hand fight in the streets, and burnt a great many houses, in 1643. The plague also ravaged the town in 1665. The old market town first began to outgrow its ancient boundaries in 1700, at which date the population was about fifteen thousand. Birmingham began to assume importance as a manufacturing town about the middle of the 18th century. John Baskerville, by his fine printing, John Taylor by innumerable fancy articles, Boulton and Watt by the introduction of the steam engine, helped to make Birmingham "the toytshop of Europe" as Burke described it. In the 19th century the introduction of steel pens and electro-plated goods, gave Birmingham new fame as a manufacturing centre. It also attracted attention as the centre from whence spread the Reform agitation of 1830, which culminated in the Reform Bill of Earl Grey, which became law in 1832. Birmingham had also an unenviable reputation for rioting and disturbance at the end of the 18th century, and the Priestley Riot of July 1791 is among the memorable *émules* of that century.

The general healthfulness of Birmingham is probably due to the large quantity of open space which it possesses; to the general excellence of its drainage, greatly facilitated by the substratum of sand and gravel (belonging to the new red sandstone or Trias formation) on which it is built; and the circumstance that there is scarcely an underground dwelling or cellar (used as a dwelling) within its precincts. In 1905 the birth-rate was 29.2 and the death-rate 16.1 per thousand. In 1801 the population was 75,670; in 1909, 564,000, but this does not take into account the densely populated boroughs and urban districts by which the city is closely surrounded. With the inclusion of these the urban population of the midland metropolis would amount to 820,000.

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R. K. DENT,

Chief Librarian Aston Manor, and author of 'Old and New Birmingham,' etc.

Birnam, Scotland, a hill in Perthshire, in the western highlands, Scotland, rendered famous by its connection with the history of Macbeth, and immortalized by Shakespeare. It was foretold to the ambitious thane, yet guiltless, except in thought, of bloody ambition, that, until Birnam wood should come to Dunsinane, his life and power could suffer no disaster. On the approach of Malcolm with the avenging army, composed of the loyal clans, aided by Seward, Earl of Northumberland, ignorant of the prophecy, the invaders cut down the boughs and bore them as leafy screens, by which to conceal their numbers, when the report of "the moving forest" marching upon Dunsinane struck a fatal despair into the soul of the usurper.

Birney, David Bell, American military officer (son of J. G. Birney, q.v.): b. Huntsville, Ala., 29 May 1825; d. Philadelphia, Pa., 18 Oct. 1864. He was graduated at Andover, later studied law in Cincinnati and in 1848 began practice in Philadelphia where he remained for several years. In April 1861, upon the outbreak of the Civil War, he entered the Union army as lieutenant-colonel of the 23 Pennsylvania Infantry; in the summer of 1861 was commissioned colonel; in February 1862 was raised to the rank of brigadier-general of volunteers; and was promoted major-general of volunteers 23 May 1863. He served throughout the Peninsula campaign (q.v.) and with particular distinction at the battles of Yorktown and Williamsburg. He subsequently distinguished himself at the second battle of Bull Run and in the battles of Fredericksburg and Chancellorsville. He was in command of the Third Army Corps during a part of the battle of Gettysburg; from May to June 1864 was in command of a division under Gen. Hancock; and from July 1864 commanded the Tenth Corps of the Army of the James.

Birney, James G., American politician: b. Danville, Ky., 4 Feb. 1792; d. Perth Amboy, N. J., 25 Nov. 1857. He studied law, and removed early to Alabama, where he flourished in his profession and held the office of district attorney. Having had his attention turned toward the question of property in slaves, in 1833 he interested himself in the organization of a branch of the Colonization Society for the State of Alabama. Soon afterward, returning to Kentucky, he organized one there also, of which he became president. But in 1834, his views rapidly advancing, he espoused the cause of immediate emancipation in a public letter, at the same time emancipating all his own slaves, about 20 in number. This letter, the 'Letter on Colonization' (1834) was shortly afterwards followed by 'American Churches the Bulwarks of American Slavery' (1840); 'Speeches in England' (1840); and 'Examination of the Decision of the United States Supreme Court in the Case of Stroder et al. vs. Graham' (1850). Making arrangements to establish a newspaper to disseminate these views at Danville, where he resided, and where he held the situation of professor in the university, he found it impossible to have such a paper printed in Kentucky, and removed to Cincinnati, where he began to issue the *Philanthropist*. It

BIRNEY — BIRTH

had not been long published before it was found no less obnoxious to public sentiment in Ohio than it had been in Kentucky, and the press was thrown into the river. The editor, however, managed to revive the paper, and, in connection with Dr. Bailey, made it a powerful instrument in acting upon the opinion of the State. About the year 1836 he went to New York as secretary of the American Anti-Slavery Society, and for many years devoted his time and strength to the furtherance of the objects of that society by letters and articles from the press and by public addresses wherever he could make an opportunity to be heard. His purpose was to build up a political party upon the single question of slavery, to act upon the government within the forms of the Constitution; and he succeeded in forming an organization in most of the northern States, under the name of the Liberty Party. During his absence in England he was nominated in 1840 by that party for the presidency, but met with little success. He was again nominated in 1844, when he received more votes. It was charged upon his friends at the time that by withdrawing their votes from Mr. Clay, especially in the State of New York, they accomplished the election of Mr. Polk, thus aiming the death-blow at their own projects. Previous to this, in 1842, Mr. Birney had become a resident of Michigan, where not long afterward he was disabled, by a fall from his horse, from taking the active part in politics to which he had been accustomed. The latter part of his life was spent at Perth Amboy, N. J.

Birney, William, American lawyer: b. Madison County, Ala., 28 May 1819; d. Washington, D. C., 14 Aug. 1907. He was educated in Paris; took part in the Revolution of 1848, and was appointed professor of English literature in the college at Bourges, France. In 1861 he entered the United States army as a private, and was promoted through all the grades to brevet major-general. In 1863-5 he commanded a division. His writings include 'Life and Times of James G. Birney'; 'Plea for Civil and Religious Liberty,' etc.

Biton, bē-rōn, Baron de (ARMAND DE GONTAULT, ār-mān dē gōn-tō), French soldier: b. 1524; d. 1592. He took a prominent part in the civil wars between the Huguenots and Catholics, and served at the battles of Dreux, St. Denis, and Moncontour. He was made marshal of France in 1577 by Henry III. He negotiated the peace of St. Germain, and narrowly escaped the massacre of St. Bartholomew. He recovered Guienne and Languedoc from the Protestants, served in the Netherlands against the Duke of Parma, and was one of the first to recognize Henry IV. as king. He distinguished himself in various battles and was killed at the siege of Epernay.

Biron, duc de (CHARLES DE GONTAULT, shārl dē gōn-tō), French soldier, son of the preceding: b. about 1562; d. 31 July 1602. He served Henry IV. in the field with much zeal and courage, was raised to the rank of Admiral of France in 1592, and in 1598 was made a peer and duke. He thought himself, however, not sufficiently rewarded, and began to intrigue with the Spanish party against the king. In 1599 he concluded an agreement with the Duke of Savoy and the Count of Fuentes, by which he pledged himself to take up arms against his benefactor.

Meanwhile, war being declared against the Duke of Savoy (1600), Biron saw himself reduced to the necessity of attacking him. He still continued his negotiations with the enemy, however, and at last they became known to the king, who interrogated the marshal as to his designs, with promises of pardon. Biron made a partial confession and continued his intrigues as before. Notwithstanding this, Henry sent him in 1601, after the conclusion of peace with Savoy, as envoy to Queen Elizabeth of England. In the meantime the Count of Fuentes discovered the whole plot. He was tried before Parliament, and was beheaded.

Biron, Ernest John. See BIREN.

Birrell, Augustine, English essayist: b. Wavertree, near Liverpool, 19 Jan. 1850. He graduated from Cambridge and was called to the bar. In 1903 he became a Benchler of the Inner Temple; from 1896-9 was Quain professor of law in University College, London; and from 1889-1900 represented Fifeshire W. in Parliament. He is author of charming critical and biographical essays on literary subjects, collected in the two series of 'Obiter Dicta' (1884, 2d series 1887) and 'Res Judicatae' (1892); 'Men, Women and Books' (1895). In 1887 he published a 'Life of Charlotte Brontë'; in 1897 edited Boswell's 'Life of Johnson'; in 1898 published 'Life of Sir Frank Lockwood'; 'Copyright in Books' (1899); 'Collected Essays' (1900); 'Miscellanies' (1901); 'William Hazlitt' (1902). In 1905 he became President of the Board of Education in the Liberal Cabinet and in 1907 Chief Secretary for Ireland.

Birth, or Labor, in physiology, is the act by which a female of the class Mammalia brings one of her own species into the world. When the foetus has remained its due time in the womb, and is in a condition to carry on a separate existence, it is extruded from its place of confinement, in order to live the life which belongs to its species independently of the mother. The womb having reached its maximum of growth with the increasing size of the foetus, its peculiar irritability excites in it the power of contraction; it thereby narrows the space within and pushes out the mature foetus. The period of gestation is very different in different animals, but in each particular species it is fixed with much precision. In the womb the corporeal frame of man commences existence as an embryo; after further development, appears as a foetus; then as an immature, and finally a mature, child. With its growth and increasing size the membranes which envelop it enlarge, the womb also expanding to give room for it. At the end of the 30th or the beginning of the 40th week the child has reached its perfect state and is capable of living separate from the mother; hence follows in course its separation from her, that is, the birth.

Contractions of the womb gradually come on, which are called, from the painful sensations accompanying them, labor-pains. These are of two kinds: first, the preliminary pangs, which begin the labor, do not last long, are not violent, and produce the feeling of a disagreeable straining or pressure. When the pregnant female is attacked by these she is often unable to move from her place till the pang is over, after which

BIRTH RATE—BIRTHWORT

she is often free from pain for some hours. Then follow the true labor-pains; these always last longer, return sooner, and are more violent. The contractions of the womb take place in the same order as the enlargement had previously done, the upper part of it first contracting, while the mouth of the womb enlarges and grows thin, and the vagina becomes loose and distensible. By this means the fœtus, as the space within the womb is gradually narrowed, descends with a turning motion toward the opening; the fluid contained in the membranes enveloping the fœtus, as the part making the greatest resistance, is forced out, and forms a bladder, which contributes much to the gradual enlargement of the opening of the womb. It is therefore injurious to delivery if hasty or ignorant midwives break the membranes too soon. By repeated and violent throes the membranes at length burst and discharge their contents, and some time after the head of the child appears. As the skull-bones have not yet acquired their perfect form and substance, but are attached at the crown of the head only by a strong membrane, and may be brought nearer together, the head, by the pressure which it undergoes, may be somewhat diminished in size and squeezed into a more oblong form, so as to pass through the opening of the matrix and the pelvis in which it is contained, and, finally, through the external parts of generation; and when this is done, the rest of the body soon follows.

The act of birth or delivery is accordingly, in general, not an unnatural, dangerous, and diseased state of the system, as many timid women imagine. It is a natural process of development, which is no more a disease than the cutting of the teeth or the coming on of puberty, although, like them, it may give rise to important changes in the body and to various diseases. It is true that the process of child-birth requires a violent exertion of nature, but this is facilitated by many preparatives and helps adapted to the purpose. If the birth succeeds in the way described, it is called a natural birth. For this it is requisite that the pelvis should be properly formed, and that the opening should permit a free passage to the perfect fœtus; that the growth and size of the fœtus should be proportioned to the pelvis, especially that the head should have the size designed by nature, proportioned to the diameter of the pelvis; also, that there should be a proper situation of the womb, in regard to the axis of the pelvis, and a proper position of the fœtus, namely, the head down, the back of the head in front and toward the opening of the womb, so as to appear first at birth; and, finally, that the external parts of generation should be in a natural state.

An easy birth takes place without any excessive strainings and in due season. A difficult birth proceeds naturally, but is joined with great efforts and pangs, and occupies a long time—over six or eight hours. The cause of it is sometimes the stiffness of the fibres of the mother, her advanced years, the disproportionate size of the child's head, and various other causes. Nature, however, finishes even these births; and women in labor ought not to be immediately dejected and impatient on account of these difficulties. An unnatural (or properly, an irregular) birth is one in which one or more of the above-mentioned requisites to a natural birth are wanting. An artificial birth is that

which is accomplished by the help of art, with instruments or the hands of the attendant. Premature birth is one which happens some weeks before the usual time, namely, after the seventh and before the end of the ninth month. Though nature has assigned the period of 40 weeks for the full maturing of the fœtus, it sometimes attains, some weeks before this period has elapsed, such a growth that it may be preserved alive, in some cases, after its separation from the mother. That it has not reached its mature state is determined by various indications. Such a child, for instance, does not cry like full-grown infants, but only utters a faint sound, sleeps constantly, and must be kept constantly warm, otherwise its hands and feet immediately become chilled. Besides this, in a premature child, more or less, according as it is more or less premature, the skin over the whole body is red, often indeed blue, covered with a fine, long, woolly hair, especially on the sides of the face, and on the back; the fontanel of the head is large, the skull-bones easily moved; the face looks old and wrinkled; the eyes are generally closed; the nails on the fingers and toes short, tender, and soft, hardly a line in length; the weight of such a child is under six, often under five pounds. The birth is called untimely when the fœtus is separated from the womb before the seventh month. Such children can be rarely kept alive; there are instances, however, of five months' children living. Some writers have contended that a seven months' child is more likely to live than one born a month later.

Late birth is a birth after the usual period of 40 weeks. As this reckoning of the time from pregnancy to birth is founded for the most part solely on the evidence of the mother, there is much room for mistake or deception. The question is one of much interest in medical jurisprudence, as the inquiry often arises whether a child born more than 40 weeks after the death of the reputed father is to be considered legitimate or not. The importance of the question and the uncertainty of the proof have occasioned a great variety of opinions among medical writers. Most of them doubt the truth of the mother's assertions about such a delayed birth, and give, as their reason, that nature confines herself to the fixed period of pregnancy; that grief, sickness, etc., cannot hinder the growth of the fœtus, etc. Others maintain, on the contrary, that nature binds herself to no fixed rules; that various causes may delay the growth of the child, etc.

Abortion and miscarriage take place when a fœtus is brought forth so immature that it cannot live. They happen from the beginning of pregnancy to the seventh month, but most frequently in the third month. The occasions, especially in those of a susceptible or sanguine temperament, are violent shocks of body or mind by blows, falling, dancing, cramp, passion, etc.

Birth Rate. See VITAL STATISTICS.

Birthmark. See NÆVUS.

Birthright, any right or privilege to which a person is entitled by birth, such as an estate descendible by law to an heir, or civil liberty under a free constitution. See PRIMOGENITURE.

Birthroot. See TRILLIUM.

Birthwort. See ARISTOLOCHIA.

BIRU — BISCHOFF

Biru, the name of a warlike chief of South America who flourished in the 16th century. During an exploring expedition of Gaspar de Morales in 1515 the Spaniards encountered a chief called Biru, by whom they were repulsed. His territory extended on both sides of the river Biru or Piru. All the country south of the Gulf of Panama was soon characterized as the Biru country. In 1526 this name was given to the empire of the Incas, now known as Peru.

Bisbee, Arizona, town of Cochise County, the terminus of a branch line of the El Paso and Southwestern R.R., which connects with the Southern Pacific R.R. at Benson. Bisbee lies in a cañon of the Mule Pass Mountain, about 30 miles south of Tombstone, the county capital, and is a busy copper mining and smelting centre. Pop. about 3,500.

Bis'cay, (Spanish VIZCAYA, vēth-cā-yā), also called BILBAO, a province of Spain, forming one of the three Basque provinces (Provincias Vascongadas), the other two being Alava and Guipuzcoa. It lies near the northeast corner of Spain, between the Bay of Biscay and the provinces of Santander, Burgos, Alava, and Guipuzcoa. The area is 850 square miles; the population 183,098. The surface is generally mountainous; the principal river is the Nervion or Ibaizabal. In point of soil and natural productions Biscay is one of the least favored provinces of Spain; but the industry of the inhabitants has been successfully exerted in converting naturally barren tracts into fruitful fields and verdant pastures. The chief crops are maize and barley. Many fine fruits, especially nectarines, are raised; walnuts and chestnuts everywhere abound and form a considerable export to England and Germany. The cattle are of a small and inferior breed; and the rearing of sheep for wool is rendered difficult by the brushwood which covers great part of the mountain districts and tears and destroys the fleece. Fish abound along the coast, and give occupation to a great number of fishing-boats. The most important mineral is iron, which is found of excellent quality throughout the province, and is extensively worked. Lead, copper, and zinc also occur. The inhabitants of Biscay, who are called Basques, are brave, active, and industrious. The capital of Biscay is Bilbao; of Guipuzcoa, St. Sebastian; of Alava, Vittoria; of Navarre, Pampeluna.

Biscay, Bay of, that portion of the Atlantic Ocean which sweeps in along the northern shores of the Spanish Peninsula in an almost straight line from Cape Ortegal to St. Jean de Luz, at the western foot of the Pyrénées, and thence curves north along the western shores of France to the island of Ushant. Its extreme width is about 400 miles, and its length much about the same. The depth of water varies from 20 to 200 fathoms, being greatest along the northern shores of Spain. The whole of the southern coast is bold and rocky, and great parts of the French shores are low and sandy. The bay receives numerous unimportant streams from the mountains of Spain, and, through the rivers Loire, Charente, Gironde, and Adour, the waters of half the surface of France. Its chief ports are Santander, Bilbao, and San Sebastian, in Spain; and Bayonne, Bordeaux, Rochefort,

La Rochelle, and Nantes, in France. Navigation of the bay is proverbially trying to inexperienced voyagers, and is frequently rendered dangerous by the prevalence of strong winds, especially westerly ones. Rennel Current sweeps in from the ocean round the northern coast of Spain.

Bisceglie, bē-shāl-ya, Italy, a seaport town in the province of Bari, 13 miles east-southeast of Barletta, on a rock on the western shore of the Adriatic, surrounded by walls, and in general badly built. It has a cathedral, two collegiate and several other churches, convents for both sexes, a seminary, and hospital. The port admits vessels of small burden only. The town being almost destitute of water, rain is collected in large cisterns cut in the solid rock. The neighborhood produces good wine. Important fairs are held here twice a year. Pop. about 31,000.

Bischof, Karl Gustav Christoph, bish'ōf, kār'l goo'stāv kris'tōf, German geologist and chemist: b. Nuremberg, 18 Jan. 1792; d. Bonn, 30 Nov. 1870. He studied in Erlangen; became professor of chemistry and technology there in 1819, and professor of chemistry and mineralogy at Bonn in 1822. He devoted himself especially to geological research and advanced some entirely new opinions in regard to the formation of mountain ranges. In connection with his work in this line he wrote 'The Volcanic Mineral Springs of France and Germany'; 'Concerning Glaciers and their Relation to the Elevation of the Alps'; and 'Concerning the Formation of Quartz and Metal Ores.' His paper on internal terrestrial heat received a prize from the Scientific Society of Holland; and he also published in English 'Researches on the Internal Heat of the Globe.' His greatest work 'Text-book of Chemical and Physical Geology' is an important contribution to the development of that phase of geological research.

Bischoff, Joseph Eduard Konrad, bish'ōf, yō'sēf ēd'oo-ārd kōn'rād, German novelist: b. Niedergailbach, 9 Aug 1828. He was fitted for the priesthood, studying at the Catholic Seminary at Munich, and was ordained a priest, but later gave his whole attention to literary work and wrote a number of novels in which he attacks the Protestant Reformation and the modern movement in literature and science. Among his works are 'Historical Novels concerning Frederick II. and his Time'; 'Gustavus Adolphus'; 'The Free Thinkers'; 'The Social Democrats and their Fathers'; and 'Otto the Great.'

Bischoff, Theodor Ludwig Wilhelm, tā'ō-dōr lood'vig vīl'hēlm, bish'ōf, German physiologist: b. Hanover, 28 Oct. 1807; d. Munich, 5 Dec. 1882. He was educated at Bonn; was lecturer in the university there in 1833; and professor at Heidelberg in 1836; in 1844 he went to the university at Giessen; and in 1855 to Munich, retiring from active work in 1878. His chief work was a series of books on the history of the development of man and some of the higher animals, and his 'Evidence of the Periodic Ripening and Detachment of the Ova, independently of Generation in Man and the Mammals.' He also established the presence of carbonic acid and oxygen in the blood, and studied the difference between man and the anthropoid apes.

BISCHOFF — BISHOP

Bischoff, Mount, Tasmania, a town 60 miles west of Launceston, which owes its existence to the discovery here in 1872, by James Smith, of some of the richest tin mines in the world. Between 1884-6 more than 20,000 tons of tin ore had been mined. The yield of pure tin from the ore is from 70 to 80 per cent. There is railway communication with Emu Bay, 45 miles distant.

Biscuit, a thin cake, baked until crisp and dry. In this shape it is known in the United States as a cracker; the name biscuit being applied to a soft cake made from dough raised with yeast. Plain biscuits are more nutritious than an equal weight of bread, but owing to their hardness and dryness, they should be more thoroughly masticated to insure their easy digestion. When exposed to moisture, biscuits are apt to lose their brittleness and become moldy, hence it is necessary to keep them in a dry atmosphere. Digestive biscuits consist almost entirely of bran. Charcoal biscuits contain about 10 per cent of powdered vegetable charcoal. Meat biscuits, which are very nutritious, contain either extract of meat, or lean meat which has been dried and ground to a fine powder.

In pottery, articles molded and baked in an oven, preparatory to the glazing and burning. In the biscuit form, pottery is bibulous, but the glaze sinks into the pores and fuses in the kiln, forming a vitreous coating to the ware.

Bisharrin, *bē-shā-rēn'*, a tribe of northeast Africa, forming the northern division of the Beja, said to be the Kushites of the Bible. They live between the Red Sea and the Nile and between Egypt and Abyssinia; they are nomadic in habit and nominally Mohammedans. They are of Caucasian race and speak a well-developed Hamitic language.

Bishop, Anna Riviera, English singer: b. London, 1814; d. New York, 18 March 1884. She married Sir Henry Rowley Bishop, the composer, in 1831, and was married a second time to Mr. Schultz of New York in 1858. She made her first appearance as a concert singer in 1837; made a tour of the Continent in 1839; and 1847 sang in United States, Canada, and Mexico, where she was very popular. She lost her voice in 1868.

Bishop, Sir Henry Rowley, English musical composer: b. London, 18 Nov. 1786; d. 30 April 1855. He was trained to his profession under Signor Bianchi, composer to the London Opera House. In 1809 his first important opera, the 'Circassian Bride,' was produced at Drury Lane with great success; but the following evening, the theatre, with the score of Bishop's opera, was consumed by fire. Numerous operas and other musical pieces now followed of his composition, and from this period to 1826 upward of 70 works were produced by him. Among others may be mentioned the music of 'Guy Mannering'; 'The Slave'; 'The Miller and His Men'; 'Maid Marian'; 'The Virgin of the Sun,' and adaptations of 'The Barber of Seville' and the 'Marriage of Figaro.' From 1810 to 1824 he acted as musical composer and director to Covent Garden Theatre. He also arranged several volumes of the 'National Melodies,' and completed the arrangement of the music for Moore's 'Irish Melodies,' commenced

by Sir John Stevenson. In 1826 Bishop produced an opera called 'Aladdin,' which was not successful. He was elected Reid professor of music in Edinburgh University in 1841, was knighted in 1842, and in 1848 became professor of music in the University of Oxford. Some of his work is the most popular of all music among English-speaking people, particularly his setting of John Howard Payne's "Home Sweet Home," and "When the Bloom is on the Rye."

Bishop, Isabella (*Burn*), English author and traveler: b. Boroughbridge Hall, Yorkshire, 15 Oct. 1832; d. 7 Oct. 1904. She began to travel at the age of 22 and made her first trip abroad in 1855, when she visited Prince Edward's Island and the United States, and afterward circumnavigated the globe three times. In recent years she spent much time in Japan, and in 1894-5 made her third trip to Korea. She was in Seoul when the war broke out, 1894, and was the first person whose war correspondence reached London. She was a Fellow of the Royal Geographical Society. In 1892 she was elected the first lady Fellow of the Royal Geographical Society and in 1901 rode 1,000 miles in Morocco. She was married in 1881 to John Bishop, who died five years later. Her publications include: 'The English Woman in America' (1856); 'Six Months in the Sandwich Islands' (1873); 'The Hawaiian Archipelago' (1875); 'A Lady's Life in the Rocky Mountains' (1874); 'Unbeaten Tracks in Japan' (1880); 'Journeys in Persia and Kurdistan' (1892); 'Among the Tibetans' (1894); 'Korea and Her Neighbors' (1898); 'The Yangtze Valley and Beyond' (1899); 'Pictures from China' (1900), the three last-named works being the result of three years of Asiatic travel.

Bishop, John Remsen, American educator: b. New Brunswick, N. J., 17 Sept. 1860. He was graduated at Harvard University in 1882; taught Greek and English at St. Paul's School, Concord, N. H., in 1882-3; was principal of the Princeton Preparatory School in 1884-7; instructor of Greek and Latin at Hughes High School, Cincinnati, in 1888-95; principal of the Walnut Hills High School, Cincinnati, 1895-1904; and since 1904 principal of the Eastern High School, Detroit. He is the author of 'Virgil's Georgics Edited for Sight Reading,' etc.; editor of 'Cicero's Orations'; an active promoter of local and national educational organizations; and a member of the American Social Science Association.

Bishop, Louis Faugeres, American physician: b. New Brunswick, N. J., 14 March 1864. He graduated at Rutgers College in 1885, and at the New York College of Physicians and Surgeons in 1889. He was resident physician of St. Luke's Hospital, New York, in 1889-92, and secretary of the New York Academy of Medicine and chairman of its Section of Medicine in 1900. His publications include 'Theory and Treatment of Rheumatism'; 'Diagnosis and Treatment of Gout'; 'Important Points in the Treatment of Pneumonia,' etc.

Bishop, Seth Scott, American physician: b. Fond du Lac, Wis., 7 Feb. 1852. He graduated at the Northwestern University in 1876. He began practice in Chicago, and in 1900 was professor of otology in the Chicago Post-Graduate Medical School and Hospital; Profes-

BISHOP

sor of diseases of the nose, throat, and ear in the Illinois Medical College; and surgeon to the Illinois Hospital and the Post-Graduate Hospital. He was also consulting surgeon to the Mary Thompson Hospital, the Illinois Masonic Orphan's Home in Chicago, and the Silver Cross Hospital in Joliet. He was a member of the International Medical Congress, the Pan-American Medical Congress, the American Medical Association, etc. He has written 'Diseases of the Ear, Nose, and Throat, and Their Accessory Cavities,' besides many monographs, and is one of the editors of 'The Laryngoscope.'

Bishop, William Henry, American novelist: b. Hartford, Conn., 7 Jan. 1847. He was graduated at Yale in 1867, and became professor of Spanish language and literature in its scientific school (Sheffield), resigning in February 1902 to spend several years in travel in Spain and elsewhere. He became U. S. consul at Genoa, Italy, 1903, and was transferred to Palermo, 1 Jan. 1905. He has written several novels, including 'Detmold' (1879); 'The House of a Merchant Prince' (1882); 'A Pound of Cure: A Story of Monte Carlo' (1894); 'Fish and Men in the Maine Islands'; 'A House Hunter in Europe'; 'Writing to Rosina,' a story; 'The Golden Justice'; 'Choy Susan and Other Stories'; 'The Brown-Stone Boy and Other Queer People,' and many similar works; also a book of travel, 'Old Mexico and Her Lost Provinces.'

Bishop-Auckland, England, a market town, in the county and nine miles southwest from the city of Durham, is situated on an eminence at the confluence of the Gaunless with the Wear, and has much improved in recent times. Near it is Auckland Palace, the episcopal residence, and among its buildings are a free grammar school (founded 1605), St. Anne Chapel, Edgar Memorial Hall, Lightfoot Church Institute, and the Temperance Hall. It is almost wholly supported by the coal traffic. Pop. about 13,000.

Bishop (Sax. *biscop*, from Gr. *episcopos*, a superintendent), in the Greek, Latin, and Anglican churches, the title given to those who are of the highest order of the priesthood, to the successors of the 12 apostles, in distinction from the priests who are the successors of the 72 disciples; in the Methodist Episcopal and Moravian churches, and in the Protestant churches of Sweden, Norway, and Denmark, it is the title given to the highest officers in the ministry, who are not, however, regarded as a distinct order; in Germany the office is hardly more than titular, and is conferred upon princes as well as ecclesiastics. The name was borrowed by the first Christians from the languages of Greece and Rome, in which it designated a civil magistrate. Thus, Cicero was at one time *episcopus ora campanie*. In the New Testament, the words bishop and presbyter, or priest, are sometimes interchanged, as in Acts xx. 17, 28, and St. John, in his last two epistles, adopts the title of priest. Yet, as maintained by Roman Catholic writers, it does not follow because the names priest and bishop were then applied indistinctly, that there existed no distinction between the episcopate and the priesthood. "There might have been confusion in the names," says St. Thomas, "but not in the character." The identity of the original signification of the words *presbyter* and *bishop* was acknowledged by

the Christian fathers St. Jerome and St. Augustine in the 5th century, and even by Pope Urban II. at the end of the 11th century, and it is not denied by many Episcopalians even at the present day. By the Council of Trent, however, the doctrine which placed presbyters and bishops originally on a footing of perfect equality in the early Church was declared as a heresy, the object of which was to deny to the bishops of the Church the priority of rank which they claimed.

Those who adhere to the Episcopal form of Church government, and at the same time admit the original identity of presbyters and bishops, differ from the Presbyterians in their theory of the origin of the episcopal authority. The Episcopalians maintain that even before the words had a separate meaning attached to them the distinction between bishops and subordinate pastors existed in fact, and was a regular ecclesiastical institution, those who held a peculiar authority over others being appointed originally by the apostles. The Presbyterians, on the other hand, believe that the authority that was undoubtedly conceded to certain of the "bishops" or "presbyters" when they met to consider the affairs of the Church, was not due to any formal appointment, but merely to the mutual agreement of the assembled presbyters, and that this distinction was no more than a mark of respect paid to some member who was venerable by his age or distinguished by his piety. But, whichever of these two theories may be correct, there is no doubt of the fact that a comparatively early period in the history of the Church a position of authority was acquired by the pastors of the Christian communities belonging to certain places, and that these came to be distinguished from the others by the name of bishops. The growth of this authority was favored by the doctrine which we find stated in the beginning of the 2d century with regard to the priestly dignity being a peculiarly divine institution. The more this doctrine was affirmed the higher grew the claims of the bishops. Ignatius of Antioch, who died about 115, had already declared every bishop to be a representative of Christ, in which we have the statement of the doctrine of the apostolic succession, that is to say, the doctrine of the transmission of the ministerial authority in uninterrupted succession from Christ to the apostles, and through these from one bishop to another. By the foundation of new churches in the larger towns which were affiliated to the original churches, and by the dependence of the presbyters in the country districts upon those having urban charges, the authority of the bishops came to be gradually extended over greater or less dioceses; and at the same time the bishops began to reserve to themselves peculiar privileges. As the early Church advanced and increased in growth, the offices and jurisdiction of the bishops developed correspondingly and by the 2d century their duties are clearly marked off from the subordinate clergy.

While this then was the position of the bishops in relation to the presbyters, they at first considered themselves as standing on a footing of equality in relation to each other. But as certain of the presbyters in their assemblies had acquired a priority of rank over the others, it gradually came about in the same

BISHOP

way that the bishops of the chief cities (Jerusalem, Antioch, Corinth, Alexandria, Constantinople, Rome) obtained a similar precedence among the bishops, and received the title of metropolitan bishops; and very early in the history of Christianity we find the Bishop of Rome claiming to be the head of the Church as the true successor of Peter, whom Christ himself had pronounced to be the rock on which he would build his Church. Roman Catholic writers found this supremacy of Peter upon the evidence of Scriptures, upon the *a priori* argument of the necessity of one supreme head both in the matter of government and the preservation of the integrity of doctrine, and upon the testimony of early ecclesiastical writers, who witness to the tradition of the universal supremacy of the Roman see.

After the transfer of the capital of the Roman empire to Constantinople, this city rapidly rose to ecclesiastical importance and became a metropolitan see. Its bishops made claim to be the first see in the Christian world after Rome on account of the imperial dignity of the city, but this assumption was stoutly resisted by the apostolic sees of the East, whom Rome always sustained against Constantinople's claim. After the Greek schism, Constantinople assumed the primacy of the Greek Church.

The practice of solemnly investing bishops with their offices dates from the 7th century. Already in the 5th century the Popes had begun to send to the newly elected metropolitan bishops (now called archbishops) the pallium, a kind of official mantle worn by archbishops, as a token of their sanction of the choice. Two centuries later it became the custom to consecrate bishops by investing them with the ring and crosier, the former as a token of marriage with the Church, the latter as a symbol of the pastoral office. Since this investiture was what gave validity to the election of the bishops, it became the source of long-continued contests between the Popes and the temporal sovereigns in the Middle Ages. The influential position which the bishops occupied in the state caused the temporal rulers to be desirous of keeping the right of investiture in their own hands, while the Popes with equal determination claimed the right for themselves. The contest was most bitter between the Popes and the emperors of the Romans, as they were called. It began in the 11th century, but was not settled till 1122, when it was agreed in the concordat of Worms between Pope Calixtus II. and the Emperor Henry V. that the election of bishops should take place according to the laws of the Church, under the direction of the emperor, and that the spiritual investiture (with ring and crosier) should remain in the hands of the Pope, while the bishops were to be invested with the temporal rights of their office by the emperor. This is still the fundamental law of the Roman Catholic Church with regard to investiture. The election to a bishopric is for the most part in the hands of the dean and chapter of the cathedral of the diocese; but in some cases it is a right of the territorial sovereign. In any case papal confirmation is requisite before the appointment is complete. Roman Catholic bishops in England are appointed exclusively by the Pope.

When the system of the ecclesiastical rule was matured, the almost absolute authority which

they exercised over the clergy of their dioceses; their intervention in the secular concerns of the governments, to which they soon rendered themselves necessary by their superior information and their elevated rank; the administration of the Church revenues; and their extensive ecclesiastical as well as criminal jurisdiction, drew them into the vortex of secular affairs, sometimes at spiritual expense. Still it continued to be the bishop's duty to teach and preach in his own diocese, to watch over purity of doctrine, to see that the people were provided with the sacraments, to visit the churches in his diocese, etc. The most distinctive functions of their spiritual office remained as they still are, the ordination of the clergy, the consecration of other bishops, the confirmation of youth, the consecration of churches, etc. In the Middle Ages they attached to themselves subordinate or assistant bishops called suffragans or coadjutors, who often had intrusted to them the performance of those functions which more especially concerned the Church. The episcopal office being such as we have described it, the nobility, and even the sons of princes and kings, strove to obtain a dignity which was as honorable as it was profitable, and was not deemed incompatible with festivities and luxurious enjoyments. The splendid establishments which they were able to maintain from the large revenues derived chiefly from rich donations to their churches by pious devotees, gave, to the bishops of Germany particularly, a high degree of dignity. They became princes of the empire, and their influence on public affairs was highly important.

The Reformation lessened the number of bishops, and though in some of the Protestant countries of the north of Europe the higher clergy have retained the title of bishop, yet they have lost the greater part of their former revenues and privileges, though in neither of these particulars have those of England any reason to complain. The English Church has left to its bishops more authority than the rest, and this is one reason why it bears the name of episcopal. To them belong ordination, confirmation, the consecration of churches, the licensing of curates, and institution to benefices. They receive their appointment from the Crown. In Prussia, though the majority of the population are Protestants, the Roman Catholic bishops receive an annual allowance from the state. Some bishops in the Roman Catholic Church are nominally in charge of dioceses in countries which do not acknowledge the Christian faith. The dioceses of such bishops are said to lie *in partibus infidelium* (in parts belonging to unbelievers), and they are chiefly those that were wrested from the Christian Church by the Mohammedans.

The appointment of bishops was one of the grievances of the American colonists; few things more exasperated them than the scheme of appointing and sending out a bishop from England. It is said that there was a project of making Dean Swift bishop of the American colonies. In 1771, at the instance of the clergy of New York and New Jersey, the plan was again urged. The clergy of Virginia generally assented, but throughout America the dissenters and the Episcopal laity opposed. After the Revolution the case was altered. The first Episcopal bishop, Samuel Seabury, of Connecticut,

BISHOP'S BOOK—BISMARCK-SCHÖNHAUSEN

was consecrated by Scotch non-juring bishops in 1784. The Methodists began to use the term bishop in 1787. The first Roman Catholic bishop, John Carroll, of Baltimore, was consecrated in 1790. See ARCHBISHOP; APOSTOLIC SUCCESSION.

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Bishop's Book, a handbook of instruction and doctrine compiled in 1537 by a committee of bishops and ministers of the Anglican Church. It is to be found in 'Formularies of the Faith Put Forth by Authority During the Reign of Henry VIII.'

Bishops Suffragan, a class of bishops in England appointed by the Crown to take the places of the early bishops in *partibus*, who were assistants to the active bishops of English sees, and who held their warrant at the pleasure of the bishops to whom they were assigned. They were distinguished from suffragan bishops in the Church of England, as every regular bishop was a suffragan of his superior or metropolitan.

Biskara, bēs'ka-rā, or **Biskra**, Algeria, a town situated at the southern base of the last spurs of the Aures Mountains, about 120 miles south-southwest of Constantine. The railway from Philippeville, on the Mediterranean, terminates here. New Biskara, or the French town, has about 10,000 inhabitants. Old Biskara, which is inhabited chiefly by Arabs, Berbers, and Negroes, has a population of about 75,000.

Bismarck-Schönhausen, Herbert Nikolaus, Prince von, her'bert nīk'ō-lōws bēs'mārk-shēn'how-sēn, German statesman: b. Berlin, 28 Dec. 1849; son of Otto Eduard Leopold, Prince von Bismarck-Schönhausen. He served as secretary to the London Embassy, and on his father's retirement he was provisionally charged with the foreign affairs of the empire. In 1886 he was secretary of state, and in January 1889, the emperor conferred on him the first class of the Order of the Red Eagle. When his father resigned, Hubert withdrew from the diplomatic service, and remained upon his estate for several years. In 1893 and 1898 he was a member of the Conservative party in the Reichstag. His speeches are published under the title, 'Politische Reden' (1899).

Bismarck-Schönhausen, Otto Eduard Leopold, Prince, ōt'ēd ēd'ōo-ārd lā'ō-pōld bēs'mārk-shēn'how-sēn: b. of a noble family of the 'Mark' (Brandenburg), at Schönhausen, 1 April, 1815; d. 30 July 1898. He studied at Göttingen, Berlin, and Greifswald; entered the army and became lieutenant in the Landwehr. After a brief interval devoted to his estates and to the office of inspector of dikes, he became in 1846 a member of the provincial diet of Saxony. And later he entered the diet of Prussia, when he began to attract attention as an Ultra Royalist. He opposed the scheme of a German empire as proposed by the Frankfort Parliament of 1849. His diplomatic career began in 1851, when he was appointed Prussian member of the resuscitated German diet at Frankfort. In the diet, he gave open expression to the long-felt discontent with the predominance of Austria, and demanded equal rights for Prussia. He remained at Frankfort till 1859, when he beheld in the approach of the Italian war an

opportunity of freeing Prussia and Germany from the dominance of Austria. In the spring of 1862 King William, on the urgent advice of the Prince of Hohenzollern, transferred Bismarck as ambassador to Paris, in order to give him an insight into the politics of the Tuileries. During his short stay at Paris Bismarck visited London, and had interviews with the leading politicians of the time, including Lord Palmerston and Disraeli. In the autumn Bismarck was recalled, to take the portfolio of the ministry of foreign affairs, and the presidency of the cabinet. Not being able to pass the organization bill and the budget, he closed the chambers (October 1862), announcing to the deputies that the king's government would be obliged to do without their sanction. When the 'conflict era,' as it was called, approached a crisis, the death of the king of Denmark reopened the Schleswig-Holstein question, and excited a fever of national German feeling, which Bismarck was adroit enough to work so as to aggrandize Prussia by the acquisition of the Elbe duchies. After helping to humiliate Denmark, Bismarck carried out his hard-hearted policy for the humiliation of Austria, which was accomplished with the defeat of Austria in the war of 1866.

The action of France in regard to the candidature of Prince Leopold of Hohenzollern for the throne of Spain gave Bismarck the opportunity of carrying into action the intensified feeling of unity among Germans. During the war of 1870-1, Bismarck was the spokesman of Germany; he it was that in February 1871, dictated the terms of peace to France. Having been made a count in 1866, he was now created a prince and chancellor of the German empire. Following the Peace of Frankfurt (10 May 1871), the sole aim of Bismarck's policy, domestic and foreign, was to consolidate the young empire of his own creating. Thus, conceiving the unity of the nation and the authority of its government to be endangered by the Catholic Church and its doctrine of papal infallibility, he embarked on that long and bitter struggle with the Vatican, called the Kulturkampf, in the course of which the Imperial and Prussian parliaments passed a series of most stringent measures (Falk or May laws) against the Catholic hierarchy. But Bismarck had under-rated the resisting power of the Church, and motives of political expediency gradually led him to modify or repeal the most oppressive of the anti-papal edicts, leaving the Catholics virtual masters of the field. Otherwise, his domestic policy was marked, among other things, by a reformed coinage, a codification of law, a nationalization of the Prussian railways (as a preliminary step to Imperial State lines), fiscal reform in the direction of making the empire self-supporting (that is, independent of matricular contributions from its component states), repeated increase of the army and the regular voting of its estimates for seven years at a time (military septennate), the introduction of a protective tariff (1879), and the attempt to combat social democracy.

In 1884 Bismarck inaugurated the career of Germany as a colonizing power, a new departure which brought him into sharp but temporary conflict with the England of Gladstone. For the rest, his foreign policy mainly aimed at isolating France and rendering her incapable of forming anti-German alliances. On the other hand, he

gradually combined the central powers of Europe into a peace league, aiming at counteracting the aggressiveness of Russia and France, separately or combined, on the Danube or the Rhine. The nucleus of this peace league was formed in 1879 by the Austro-German Treaty of Alliance (published in February 1888) which Italy formally joined in 1886, and which entitles Bismarck to be called the "peacemaker" and the "peacekeeper" of Europe, a character he first publicly acquired when, as "honest broker" between Austria and Russia, he presided over the Berlin Congress in 1878. The phrase, "man of blood and iron," is based on the Iron Chancellor's own use of the words in a speech in 1862.

Bismarck's life was often threatened, and twice actually attempted—once at Berlin in 1866, just before the Bohemian campaign, by Ferdinand Cohen (or Blind), a crazy youth who aimed at making himself the instrument of popular dissatisfaction with Bismarck, as the champion of absolutism and the fancied apostle of a fratricidal war; and again in 1874 at Kissingen, by a Roman Catholic tinsmith named Kullmann, who was unquestionably a product of Ultramontane fury engendered by the May laws.

Emperor William died 9 March 1888. The short reign of Emperor Frederick followed and then William II. ascended the throne. On 18 March 1890 Bismarck fell. The last cause of his fall has not been told. Many explanations have been given—that Bismarck objected to the labor rescripts, that he opposed the abolition of the laws against Socialists, that he would not tolerate the emperor's direct consultation with the other ministers or the parliamentary leaders. After the war with Denmark, King William had made Bismarck a count. After the conquest of France, Emperor William had named him prince. Emperor William II. gave him the title of Duke of Lauenburg. When Bismarck's 81st birthday was celebrated in 1896, there was talk of a reconciliation between the prince and his sovereign. The emperor sent his photograph to Bismarck, the latter returned thanks, and little by little the way was paved for a meeting between the two men, and eventually for the state visit which the emperor paid to Bismarck at Friedrichsruhe, where the statesman died.

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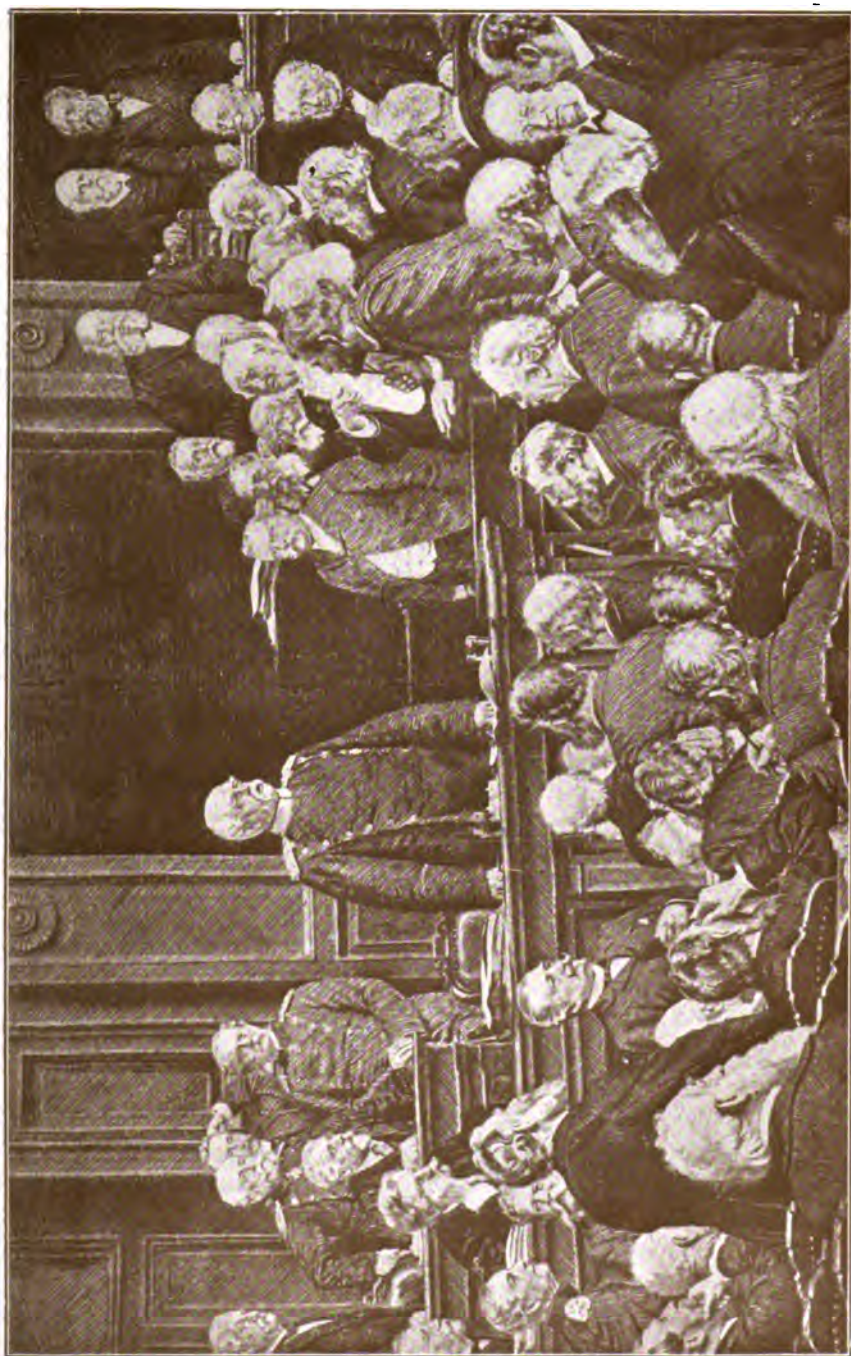
Bismarck, N. Dak., city and capital of the State; and county-seat of Burleigh County; on the Missouri River, and the Northern Pacific R.R.; 194 miles west of Fargo. It contains the State capitol (which cost over \$500,000), the State penitentiary, court-house, city hall, opera house, a State hospital for the insane, Saint Alexius' Hospital, Saint Paul's Seminary, and an immense river warehouse. The river is here spanned by a bridge that cost \$1,500,000. Bismarck has improved waterworks, electric lights, several flour mills, a national

bank, the State Library, and an assessed property valuation of nearly \$2,000,000. The city is a supply and trade centre for an extensive agricultural section, and is also a base of supplies for Indian agencies and United States military posts. Its river traffic with stations above and below it, is very heavy. Pop. (1890) 2,186; (1900) 3,319; (1910) 5,443.

Bismarck Archipelago, official name given by Germany to New Britain, New Ireland, New Hanover, and several smaller adjoining islands in the South Pacific, since in 1884, when they became a German dependency.

Bismark, Friedrich Wilhelm, frēd'vīl'hēlm, bēs'märk (COUNT VON), German general: b. Windheim, Westphalia, 28 July 1783; d. 18 July 1860. In 1796 he entered the army of Hanover as an ensign, and in 1804 was attached to the Hanoverian legion in the English army. The result of a duel forcing him to leave the English service, he entered that of the king of Württemberg, in 1807, and was soon after appointed captain of cavalry. During the campaign in Russia, he served under the command of Ney, and distinguished himself at the Beresina. He was made a prisoner at Leipsic, but returned to Württemberg in 1813. In 1815 he received the title of count; in 1819 he was appointed brigadier-general. In 1828 Count Bismark introduced his system of cavalry tactics into the Danish army, and was soon after appointed commander-in-chief of the cavalry of Württemberg. He published several military treatises, and also a work upon Russia.

Bismuth, bīz'mūth, a metallic element, first accurately described by Pott in 1739. It was known before that time, but had been previously confounded with antimony and zinc, which it resembles to some extent. The origin of the word "bismuth" is not known, although several highly improbable derivations have been suggested. For example, miners often call the metal "wismuth," and Mathesius suggests that this word comes from "Wisse," or "Wiese," meaning a meadow; because, he says, in the mines it is often found covered with incrustations of various colors, resembling a meadow covered with brilliant flowers. Bismuth occurs in nature in the metallic form, and several ores of it are also known, from which the metal may be easily obtained by roasting and smelting. The principal supply comes from Saxony, but considerable quantities are obtained from Austria, Norway, Cornwall, Spain, California, New South Wales, and portions of South America. The total consumption of the metal probably does not greatly exceed 50 tons per annum, and the demand for it is so variable that the price has ranged all the way from 50 cents to \$5 a pound. Bismuth is of a peculiar light-red color, and is highly crystalline, and so brittle that it can be readily pulverized. It melts at 510° F., and boils in the vicinity of 2300° F. Its specific gravity is about 9.82 at 54° F., that of the melted metal, just above the point of fusion, being 10.06. Its specific heat is about 0.030 at ordinary temperatures, and 0.036 just above the melting point. Its coefficient of expansion is about 0.000736 per degree Fahrenheit, its conductivity for heat is about one fiftieth of that of silver, and its electrical resistance at 32° F. is 1.15 times that of mercury at the same



BISMARCK ADDRESSING THE REICHSTAG.

BISMUTHINITE — BISON

temperature. Bismuth is readily recognized by the spectroscope, as it shows a large number of characteristic lines. Its chemical symbol is Bi, and its atomic weight is 208.5 for $O=16$, and 206.9 for $H=1$. It has a tensile strength of 6,400 pounds per square inch. According to some authorities, the specific gravity of metallic bismuth is diminished by pressure; but Spring has shown that this is not the case. He subjected a sample whose specific gravity was 9.804 to a pressure of 20,000 atmospheres, and found that the specific gravity rose to 9.856, while a second compression increased it still further, to 9.863. Bismuth expands upon solidifying, but Tribe has shown that this expansion does not take place until immediately after the congelation of the metal. Bismuth is the most diamagnetic substance known, a sphere of it being sensibly repelled by a magnet. It has marked thermo-electric properties also, on account of which it is much used in laboratories in the construction of delicate thermo-piles. In the arts, metallic bismuth is used chiefly in the preparation of alloys. By adding a small amount of it to lead, that metal may be hardened and toughened. An alloy consisting of three parts of lead and two of bismuth has 10 times the hardness and 20 times the tenacity of pure lead. The alloys of bismuth with both tin and lead are extremely fusible, and take fine impressions of casts and molds. An alloy of one part of bismuth, two parts of tin, and one part of lead, is used by pewter workers as a soft solder, and by soap-makers for molds. An alloy containing five parts of bismuth, two of tin, and three of lead melts at 199° F., and is somewhat used for stereotyping, and for the manufacture of metallic writing pencils. Thorpe gives the following proportions for the better known fusible metals, into which bismuth enters:

Newton's: Bismuth, 50; lead, 31.25; tin, 18.75. Melts at 202° F.

Rose's: Bismuth, 50; lead, 28.10; tin, 24.10. Melts at 203° F.

D'Arcet's: Bismuth, 50; lead, 25; tin, 25. Melts at 201° F. (If 250 parts of mercury are also added, the resulting alloy, or amalgam, melts at 113° F.)

Wood's: Bismuth, 50; lead, 25; tin, 12.50; cadmium, 12.50. Melts at 149° F.

Lipowitz's: Bismuth, 50; lead, 26.90; tin, 12.78; cadmium, 10.40. Melts at 149° F.

Guthrie's "eutectic" alloy: Bismuth, 50; lead, 20.55; tin, 21.10; cadmium, 14.03. Melting point not definitely stated, but said to be "very low."

The action of heat upon some of the foregoing alloys is remarkable. Thus, Lipowitz's alloy, which solidifies at 149° , contracts very rapidly at first, as it cools from this point. As the cooling goes on, the contraction becomes slower and slower, until the temperature falls to 101.3° F. From this point the alloy expands as it cools, until the temperature falls to about 77° F., after which it again contracts, so that at 32° a bar of the alloy has the same length as at 115° F. Alloys of bismuth have been used for making fusible plugs for steam boilers, but it is found that they are altered in some unknown way by prolonged exposure to heat, so that they cannot be relied upon, after any great length of time, to melt at the proper temperature. Some of the alloys of bismuth are also used in tempering steel.

In its compounds, bismuth has an odd valency—usually three, but sometimes five. Metallic bismuth does not oxidize readily in dry air at ordinary temperatures, but it burns with a blue flame when strongly heated in presence of air, passing into the trioxid, Bi_2O_3 . If the trioxid is dissolved in a solution of caustic potash, and nitric acid is subsequently added, bismuth peroxid (or pentoxid, Bi_2O_5 , is precipitated. The trioxid is pale yellow, and the pentoxid is brownish-red. Both unite with acids to form salts. Bismuth trichlorid, $BiCl_3$, is formed when the metal is heated in chlorine gas; it is a white, crystalline, deliquescent substance, which is decomposed by water with the formation of hydrochloric acid and bismuth oxychlorid, $BiOCl$. Bismuth trisulphid, Bi_2S_3 , is thrown down as a black, insoluble precipitate, when a stream of sulphuretted hydrogen gas is passed through an acid solution of a salt of bismuth. The trisulphid also occurs native as "bismuth glance," or Bismuthinite (q.v.). Bismuth dissolves readily in nitric acid, with the formation of the nitrate, $Bi(NO_3)_3 + 5H_2O$. A peculiarity of the soluble bismuth salts, as a class, is that their solutions are rendered milky by the addition of water in considerable excess, owing to the formation of insoluble basic compounds. The nitrate, for example, becomes transformed by this process into a series of so-called sub-nitrates.

In medicine, bismuth is used in the form of some one of this metal's insoluble salts, the soluble salts of bismuth being actively poisonous. The poisoning closely resembles that caused by lead (q.v.). The insoluble salts used most frequently are bismuth subnitrate, subcarbonate, salicylate, and subgallate. These are for the most part employed as gastric sedatives, as gastro-intestinal anti-fermentatives, and locally as bland astringent dressings.

Bismuthinite, a native sulphide of bismuth, having the formula Bi_2S_3 . It commonly occurs massive, but is also found in needle-like crystals belonging to the orthorhombic system. It is opaque, and leaden in color, often with a superficial yellowish or iridescent coating. Its hardness is 2, and its specific gravity usually about 6.5. In the United States it occurs in Connecticut, California, North Carolina, and Utah. It is also found in Mexico and Canada, and in Sweden, France, England, and Bolivia. Where it can be had in quantity, it is mined as an ore of bismuth.

Bison, a form of wild cattle regarded by some naturalists as constituting a genus *Bison*, separated from the larger group *Bos*, which is represented by the American "buffalo," the European aurochs, and some extinct species. Bisons differ from other cattle, in external appearance, mainly by their massive and shaggy forms. Their heads are exceedingly broad, and the horns curve outwardly from each side of the forehead, and are short, round, and thick. A mop of long and shaggy hair covers the forehead, nearly hiding the little eyes, and forms a great beard upon the throat and chin, especially of the bulls. In order to support this massive head, which is usually carried low, great spines rise from the vertebrae of the back over the shoulders, giving attachment to the huge muscles necessary to support the skull. This makes the neck very thick, and the fore-

BISON

quarters much higher than the haunches, which droop away from the arched contour of the back, over the withers. The massive appearance of the fore-quarters is increased by the long growth of hair on the neck, shoulders, and fore-legs, which is especially coarse and shaggy in bulls, and is of protection to them in their furious assaults upon one another in the rutting season. This hair consists mainly of a short, crisp, wool-like growth, different from that of other cattle, and capable of being woven. Internally, the bison are peculiar in having 14 ribs, instead of 13; in the breadth and convexity of the frontal bones of the skull; in having six, instead of four nasal bones; and in the comparative slenderness of the bones of the limbs. The bison are inhabitants of the northern hemisphere, and, in the era preceding the present, were represented by two or three species of probably circum-polar range. The race is represented in the Old World by the aurochs, now preserved only in small, protected herds in Russia (see AUROCHS); and in America, by the buffalo (*Bison americanus*), now nearly extinct.

The American bison or buffalo is somewhat smaller than the aurochs, and has shorter and thicker horns, and a shorter tail, but its hump and fore-quarters are higher, and more shaggy. The females are much inferior to the males in bulk, weighing only about 1,200 pounds, whereas an old bull in good condition will weigh 2,000 pounds. The American animal differs in one very important respect from the European species, due to the difference in their habitats. The auroch was a native of a region covered with forests, where large herds could not find open pasturage of any considerable extent, and consequently moved about only in small bands, whereas the American animal had open to it the immense, grassy prairies and plains of the interior of this continent, and was able, and in effect, forced to join into vast herds, so that it acquired gregarious habits. When North America was explored by white men, the bison was first encountered in the valleys of the Alleghanies, and scattered throughout the prairies of the Mississippi valley, north of the Tennessee River. Its principal home, however, was upon the grassy plains, between the Missouri River and the Rocky Mountains, where the herds sometimes contained hundreds of thousands of individuals, and grazed all the way from southern Texas to the shores of Great Slave Lake. They wandered through the valleys of the Rocky Mountains, to the plains of New Mexico, Utah, and Idaho, but seemed never to have crossed the Sierra Nevada. Those east of the Mississippi River were probably killed off before the beginning of the 19th century, and by 1850 none remained east of the dry plains. The building of the Union P. and Kansas P. R.R.'s, where the early trains were sometimes stopped by herds crossing the tracks, soon led to the disappearance of the animals from the central plains; and by 1875 they were divided into two distinct groups, a northern and a southern. These were rapidly slaughtered by parties of men who followed the animals at all seasons, and killed them for their hides, which, as "buffalo robes" became more and more valuable, until by 1890 the Texan herd had been utterly exterminated, and of the northern herd, none remained except such as had been gathered by

the government for preservation in Yellowstone Park, and a few hundred that still survive in the remote forests beyond the North Saskatchewan. The herd in Yellowstone Park amounts to about 100 and will probably be maintained under the protection of law. Small bands are living in private parks and zoological gardens in various parts of the world. Thus, perhaps, 500 or 600 living bison remain as the sole relic of the millions of these valuable animals, which half a century ago ranged our western plains, and which were recklessly wasted.

The buffalo herds were made up of small companies, consisting of a patriarchal old bull, several cows, and a number of young of various ages, and thousands of these companies would graze in the same region, all moving slowly in the same direction, so that travelers would never be out of sight of bison during a whole day's journey. They were more or less nomadic, wandering from one part of the plains to the other in search of fresh pasturage. Thus on the approach of winter a general movement always took place from the high, central plains toward the warmer south, and also into the shelter of the wooded valleys of the foot-hills. In these journeys they had the habit of traveling in single file, thus forming long, narrow paths, which the plainsmen called "buffalo trails," yet traceable in many places. In spite of their weight and apparent clumsiness, they swam rivers with ease, and climbed about the mountains with remarkable agility. Nevertheless they chose the easiest places, and the well-marked buffalo-trails were the guides for explorers, and were most deeply imprinted in those mountain passes, which are now the highways of commerce. The sexes kept together throughout the year, and as is usual among gregarious animals, there was constant fighting among the bulls for the supremacy of their bands, the old leaders being overthrown by younger and more vigorous aspirants, as soon as their strength began to wane. Thus the very best sires were continually selected by the law of battle, and the race kept at its highest point. The herding was a measure of protection against the enemies which hung upon the skirts of every band. The grizzly bear was perhaps the only animal that could vanquish a bison bull in fair fight, but pumas and wolves were ever on the watch to seize any young or feeble ones that strayed from the band. When attacked the band would instantly form a close crowd with the cows and calves in the centre, protected by the bulls, forming a circle with lowered heads on the outside. The calves were born in the spring, a single one, as a rule, to each cow after a gestation of about nine months.

To the western Indians the bison was the principal resource for food and shelter, and was continually hunted. In the days before firearms, the Indians would approach them on foot, by creeping within bowshot on all fours, often disguised in the skin of a calf or an antelope; or would rush the herds upon horseback. They also had the practice in rough countries of driving the buffaloes into enclosures or small canyons, where they could easily be slaughtered; or sometimes would force them over a cliff, to be killed by the fall. Besides eating the flesh as fresh meat, vast quantities of it would be cut into strips each autumn, and dried in the sun for winter use; while the northern tribes

BISPHAM — BISTINEAU

chopped it into fine pieces, mixed it with berries, and preserved it in skin bags, mixed with boiled fat, and so formed the highly portable and nutritious food called "pemmican." The disappearance of the buffalo consequently meant starvation to the Indians, as well as the loss of the principal material for warm clothing and bedding, and the Indian wars which raged upon the plains, during the third quarter of the 19th century, were mainly due to the desperate efforts made by these people, to preserve their hunting-grounds.

Species of fossil bisons have been found both in Europe and America, associated with the remains of mammoths, mastodons, and other extinct animals of the Quaternary Period. Some of these extinct bisons exceeded in size any of the living species, the bony horn-cores in one being six feet from tip to tip (the length of the horns themselves must have been considerably greater); the height of this species is estimated to have been over six feet at the shoulder.

The literature relating to the American buffalo is as extensive as the story of the western States. The most complete and special accounts are: J. A. Allen's monograph, 'The American Bisons' republished by the United States Geological Survey in 1875; and W. T. Hornaday's 'Extirpation of the American Bison,' in the annual report of the Smithsonian Institution for 1887. For the more picturesque and adventurous side of the animal's history, and its hunting, consult Audubon's 'Quadrupeds of America'; Catlin's 'North American Indians'; Gregg's 'Commerce of the Prairies'; Dodge's 'Black Hills'; 'Butler's 'Great Lone Land'; and the accounts of western explorations by such writers as Pike, Fremont, Marcy, Long, Emory, and Stansbury.

Bispham, bîs'pām, David S., baritone singer: b. Philadelphia, Pa., 5 Jan. 1857, of Quaker parentage. Educated at Haverford College, Pennsylvania, he later studied music and singing in England and Italy. His début was made as the Duc de Longueville in 'The Bassoche,' London, in 1891, and since then he has been the principal baritone of the Royal Opera Company, Covent Garden, London, occasionally visiting the United States on an operatic tour. An accomplished linguist, he is equally at home in German, French, or Italian, but his greatest successes have been in Wagnerian roles, such as 'Alberich' and 'Wolfram.'

Bissagos, bîs-să'gōz, a group of islands, about 20 in number, near the west coast of Africa, opposite the mouth of the Rio Grande, between lat. 10° and 12° N., belonging, like the mainland opposite, to Portugal. The largest, Orango, is about 25 miles in length, and most of them are inhabited by a rude negro race. The inhabitants cultivate maize, bananas, and palms, but their chief employment is in fishing. Most of the islands are under native chiefs, who are nominally vassals of Portugal. At Bolama, or Bulama, once a British settlement, but abandoned in 1793, there is a thriving Portuguese town, which is the seat of government.

Bissão, bês-să'ō, an island and Portuguese station closer to the African coast than the Bissagos and opposite the Jeba's delta. Before the prohibition of slavery by the Portuguese government it was an important slave market.

Bissell, Edwin Cone, American biblical scholar: b. Schoharie, N. Y., 2 March 1832; d. Chicago, 9 April 1894. He prepared for the ministry at Union Theological Seminary, N. Y., and held Congregational pastorates at Westhampton, Mass., San Francisco, Cal., and Winchester, Mass., and was professor of Hebrew in the Hartford Theological Seminary, 1881-92, and at the McCormick Presbyterian Seminary, Chicago, 1892-4. He published: 'The Historic Origin of the Bible' (1873); 'The Pentateuch: Its Origin and Structure' (1885); 'Biblical Antiquities' (1888); 'Genesis Printed in Colors, Showing the Original Sources from which it is Supposed to Have Been Compiled' (1892); 'The Apocrypha of the Old Testament, with Historical Introductions,' his greatest work (1880).

Bissell, William Henry Augustus, American prelate of the Episcopal Church: b. Randolph, Vt., 10 Nov. 1814; d. Burlington, Vt., 14 May 1893. Entering the Episcopal ministry in 1839, he was successively rector at West Troy, Lyons, and Geneva, N. Y., and 3 June 1868 was consecrated second bishop of the diocese of Vermont.

Bissell, Wilson Shannon, American lawyer: b. New London, N. Y., 31 Dec. 1847; d. Buffalo, 6 Oct. 1903. He graduated at Yale University in 1869; and studied law in Buffalo with Lansing, Cleveland & Folsom. In 1872 he formed a partnership with Lyman K. Bass, the firm of which Grover Cleveland became a member in 1873. When Mr. Cleveland was elected governor of New York the firm was dissolved. Subsequently it was reorganized, and in 1900 consisted of Bissell, Carey & Cooke. He was a delegate to several State conventions; in 1884 was a Democratic presidential elector; and in 1893-5, during Mr. Cleveland's second term as President, was postmaster-general of the United States.

Bissen, Hermann Wilhelm, bîs'sën, hër'män vil'hëlm, Danish sculptor: b. Schleswig, 1798; d. Copenhagen, 10 March 1868. From 1823 to 1833 he studied in Rome under Thorwaldsen, who, in his will, commissioned him to complete his unfinished works. In 1850 he was made director of the Academy of Arts, Copenhagen. Among his masterpieces are the 'Valkyrie,' 'Cupid Sharpening His Arrow,' and 'Moses'; his 'Orestes,' and a frieze 134 feet long, perished in the burning of the Christiansborg at Copenhagen (1884).

Bissex'tile, the ancient name of leap year, so called from the sixth day before the calends of March being repeated or taken twice. See CALENDAR.

Bisson, Alexandre, bês-sôn, ä-lëks-andr, French dramatist and musical composer: b. 1848. His vaudeville, 'Four Cuts with a Penknife,' won for him instant celebrity. 'The Deputy from Bombignac' is his masterpiece. Other comedies or operettas were: 'The Late Toupinel'; 'The Joys of Paternity'; 'The Pont-Biquet Family.' With Théodore de Lajarte he was joint author of a 'Grammar of Music' and of a 'Little Encyclopædia of Music.'

Bistineau, bîs-te-nō', a lake in northwestern Louisiana, dividing Bossier and Bienville parishes, about 30 miles in length from north to south and 2 in breadth. It receives the Dauchite

BISTORT — BITTER-SWEET

River from the north, and communicates with Red River by an outlet at its southern extremity. It is navigable for steamboats.

Bis'tort (*Polygōnum Bistorta*), a perennial plant of the buckwheat family, and from its astringent properties (it contains much tannin) sometimes used medicinally. It bears a raceme of flesh-colored flowers. It is also called adder's-wort and snake-weed, from being a supposed remedy against snake bites. The American representative is a naturalized plant (*P. viviparum*), found on Alpine summits of New England and on the shores of Lake Superior and northward. It bears an erect spike of flesh-colored flowers.

Bistre, bis'tér, a reddish brown water-color, generally obtained from the soot that collects in chimney-flues. This is pulverized and washed to remove the saline ingredients. The finest sediment is then dissolved in vinegar, to which gum-water is afterward added. It was formerly much used for making painters' crayons, and also for a paint in water-color designs. Sepia, however, is now preferred to it, as it has a more agreeable color and is more easily employed.

Bithur, be-thoor', India, a town 12 miles northwest of Cawnpore, on the right bank of the Ganges. In the Indian mutiny it had some notoriety conferred on it from being the residence of Nana Sahib, also styled the rajah of Bithoor. The town was long the abode of a line of Mahratta chiefs, the last of whom died without issue in 1851. His adopted son, Nana Sahib, whose proper name, however, was Dhundoo Punt, claimed the succession, but his title was ignored by the East India Company, a proceeding which is believed to have stimulated him to his subsequent deeds of atrocity. Gen. Havelock gained a brilliant victory over the rebels in the vicinity, and subsequently quantities of treasure belonging to the Nana were discovered by the troops in a well close to the palace. Pop. 7,000.

Bithyn'ia, anciently a country in Asia Minor, on the Black Sea, the Bosporus, and the Sea of Marmora, and bounded on the south by Phrygia. In early times it was called Bebrycia, from the Bebrycians who inhabited it. Before the time of Cræsus, Bithynia was an independent state, under its own princes. After the death of Prusias I., in the war against Cræsus, it fell into the power of the Lydians, 560 B.C.; into that of the Persians, 555 B.C.; and into that of Alexander, 334 B.C. The restorer of the Bithynian throne was Bias or Bas, a native prince, at the court of one of whose successors, Prusias II., Hannibal took refuge, and where he ended his life by poison, 183 B.C. Nicomedes, the last king of this race, bequeathed his kingdom to the Romans, 75 B.C. The famous cities of Nicomedia, Nicæa, and Heraclea were in Bithynia. In the 11th century Bithynia was conquered by the Seljuks. In 1298 a new kingdom was founded there by the Ottoman Turks, of which, in 1327, Prusa was the capital. See Ramsay, 'Historical Geography of Asia Minor' (1890).

Biting-lice. See BIRD-LICE.

Biton, bi'ton, Greek mathematician, of uncertain date, but supposed to have been a contemporary of Archimedes, wrote a work of some

interest on warlike engines, and dedicated it to Attalus, king of Pergamos. It is to be found in the 'Mathematici Veteres' of Thevenot. (2) The son of Cyclopi mentioned in the legend of Cleobis and Biton.

Bitter, Arthur, pseudonym of SAMUEL HABERSTICH, Swiss poet and story writer: b. Ried, near Schlosswyl, 21 Oct. 1821; d. Bern, 20 Feb. 1872. Novelettes, stories, and poems proceeded from his pen for many years, all characterized by sympathy of tone and inoffensive realism, 'Tales, Romances, and Poems' (1865-6), being most pleasing.

Bitter, Karl Theodore Francis, Austro-American sculptor: b. Vienna, Austria, 6 Dec. 1867. He came to the United States in 1889 and soon acquired world-wide reputation. He executed the sculpture on the main buildings of the World's Columbian Exposition, and was appointed director of sculpture at the Pan-American Exposition at Buffalo, and the Louisiana Purchase Exposition at Saint Louis.

Bitter Almonds. In medicine the oil of bitter almonds, containing prussic acid, is used as a gastric sedative and as an antispasmodic. See PRUSSIC ACID.

Bitter Ash, the quassia tree. See QUASSIA.

Bitter-root, *Lewisia rediviva*, a plant of Canada and part of the United States, order *Portulacæ*, so called from its root being bitter though edible, and indeed esteemed as an article of food by whites as well as Indians. From the root, which is long, fleshy, and tapering, grow clusters of succulent green leaves, with a fleshy stalk bearing a solitary rose-colored flower rising in the centre, and remaining open only in sunshine. Flower and leaves together, the plant appears above ground for only about six weeks. California bitter-root (*Echinocystis fabacea*) and Natal bitter-root (*Gerardanthus macrorrhiza*) both belong to the gourd family.

Bitter Root Mountains, a range of the Rocky Mountains, in Montana, deriving its name from a plant with rose-colored blossoms, whose slender roots are used by the Indians for winter food. The chief summits are Lolo Peak and St. Mary's Peak.

Bitter Root River, a tributary of the Columbia in Montana, flowing north into Clark's River in Missoula County; length about 110 miles. Gold has been found in this region.

Bitter Root Valley, a valley on the east of the Bitter Root range, in Montana, 90 miles long and 7 miles wide, enwalled by lofty mountains, and abounding in farms and cornfields.

Bitter Spar, rhomb-spar, the crystallized form of dolomite or magnesian limestone. The name is derived from the magnesia contained in it, the taste of salts of magnesia being bitter.

Bitter-sweet, *Dulcamara*, or **Woody Nightshade**, *Solanum Dulcamara*, a sprawling vine of the natural order *Solanacæ*, native of Europe and Asia, and introduced into the United States. It has purplish or blue flowers arranged in cymes which are succeeded by attractive inedible berries. The leaves have been used medicinally in the form of an extract. The name, properly false bitter-sweet, is given to *Celastrus scandens*, a handsome climber of the natural order *Celastracæ* found from eastern Canada to South Dakota and southward to New Mexico.

BITTER-SWEET — BITUMEN PROCESS

It often grows 20 feet tall and is perhaps most attractive on account of its orange-yellow fruits which split open and expose the crimson seeds. Both seeds and fruits remain attached to the plants during the winter.

Bitter-Sweet, an once popular narrative didactic poem by J. G. Holland, published 1858. It contains about 3,500 lines, and is descriptive of New England rural life.

Bitter Vetch, a name applied to two kinds of leguminous plants: (1) *Ervum ervilia*, a lentil cultivated for fodder; and (2) all the species of *Orobis*, for example, the common bitter vetch *O. tuberosus*, a perennial herbaceous plant with racemes of purple flowers and sweet edible tubers.

Bittern, a bird of the heron family and genus *Botaurus*, several species of which exist in various parts of the world. The bitterns differ from the herons in their lesser size, shorter neck, comparative shortness of the legs, and superior length of toes, and in their nocturnal habits and loud voices. Otherwise their haunts, food, and manner of life closely resemble those of herons (q.v.). The only North American species is the common bittern (*B. lentiginosus*), which is spread throughout the United States and southern Canada in all suitable places, often close to towns. Its length is about 25 inches, and the plumage is tawny brown of various shades, excessively variegated everywhere; the neck is striped with dull yellow and has on each side a dark patch. Both sexes, and the young, are alike in plumage. The Old World species (*B. stellaris*) is very similar, but has more red on the upper parts, and green about the head. It is found numerously from Ireland to Japan, in India and throughout all Africa. Other species or varieties spread the range of the genus to New Zealand and the South Sea Islands. The one great peculiarity of the bitterns, to which they owe their Latin and many local names, is their extraordinary vocal utterance in spring, which in the European species is likened to booming by everyone who has heard it, and has been called "a loud and awful voice." The old fable that this sound was produced in some mysterious way by the bird while it held its beak plunged into the mud is untrue; and the flesh is no longer esteemed as a dainty, as it was some centuries ago. The voice of the American bittern is a droning, thumping noise, which has been likened to the driving of a stake with an axe, or, more often, to the working of an old-fashioned pump-handle. Hence the rural names, "stake-driver," "mire-drum," "bog-pumper," "thunder-pump," and the like. Nuttall attempted to suggest the sound of the syllables "pump-au-gah"; but Samuels succeeds better. He writes: "In the mating season, and during the first part of the period of incubation, the male has a peculiar love-note, that almost exactly resembles the stroke of a mallet on a stake; something like the syllables 'chunk-a-lunk - chunk, quank - chunk - a-lunk - chunk.' I have often, when in the forests of northern Maine, been deceived by this note into believing that some woodman or settler was in my neighborhood, and discovered my mistake only after toiling through swamp and morass for perhaps half a mile."

A genus of smaller birds, *Ardetta*, is known as that of the "least bitterns." One species (*A.*

exilis) occurs over most of North America, and related species belong to South America. They are intermediate between the true bitterns and the night-herons.

Consult Coes, 'Birds of the Northwest' (1874); and Newton, 'Dictionary of Birds' (1896), and the other authorities therein cited.

Bittern, or **Salt Oil**, the name given to the syrupy residue from evaporated sea-water after the common salt has been taken out of it. The syrup contains salts of magnesium, which give it a bitter taste, and it is employed as a source of them. It is also one of the sources of bromine. Bittern procured from the salt works at Epsom, England, was formerly the source of sulphate of magnesium, hence styled Epsom salts. See **SALT**.

Bitternut. See **HICKORY**.

Bitters, a class of compounds largely employed as appetizers and digestants. They are for the most part alcoholic drinks to which some plant containing a bitter principle is added. The bitter principles are either alkaloids, as in the quinine of calisaya, or amaroids, which are widely distributed in plants. The most commonly employed bitters are quassia, gentian, angostura, cascarrilla, wild cherry, and cinchona. Medicinally bitters are classed as simple and aromatic, the latter containing volatile oils in addition to the bitter principles. The simple bitters mostly used are quassia, gentian, and calumba. The aromatic bitters are cascarrilla, eupatorium (boneset), angostura, serpentaria, and chamomile.

Bitterwood, various trees and shrubs of the genus *Xylopia* of the natural order *Simarubaceae*, noted for the bitterness of their wood which is used for furniture because of its resistance to insects. One Brazilian species (*X. sericea*) furnishes a peppery fruit and a cordage fibre. The name bitterwood is also given to *Picramnia excelsa* (*Quassia excelsa* of some botanists) belonging to the natural order *Simarubaceae*. This tree is a native of the West Indies and is used like quassia (q.v.).

Bit'tinger, **Lucy Forney**, American historical writer: b. Cleveland, Ohio, 29 Aug. 1859. She has published 'Memorials of Rev. J. B. Bittinger' (1891); 'History of the Forney Family of Hanover, Pennsylvania' (1893); and 'The Germans in Colonial Times,' (1901), a work of much value.

Bitu'men, a general term, perhaps first used by Pliny, and including various native hydrocarbons, such as petroleum, asphaltum, elaterite, and grahamite. The bitumens are probably all of vegetable origin, and while not confined to any particular geological formation, they occur most abundantly at or near the earth's surface, often in connection with rocks containing organic remains.

Bit'umen Process, the first known method of fixing the image of the camera, so as to make it permanent. The blackening action of light upon salts of silver was known in the 18th century, but no method was known for fixing the image obtained with salts of silver until about 1838. The bitumen process was perfected in 1827 by a Frenchman, Nicéphore de Niépce. He coated plates of metal with a solution of asphaltum in oil of lavender, and then, after drying them, he exposed them for a pro-

BITUMINOUS COAL—BIVALVES

digious length of time in a camera. A very faint image was the result. The plate was subsequently immersed in a developer consisting of one part of oil of lavender and 10 parts of petroleum, which slowly dissolved the parts unaffected by light, leaving a permanent picture formed of those parts of the asphaltum that the light had rendered insoluble. Subsequently Daguerre became associated with Niépce, and together they improved the bitumen process until Daguerre said that "the time required to procure a photographic copy of a landscape is from seven to eight hours; but single monuments, when strongly lighted by the sun, or which are themselves very bright, can be taken in about three hours." See CAMERA; PHOTOGRAPHY.

Bituminous Coal. See COAL.

Bituminous Limestone, a limestone impregnated with asphaltum or mineral pitch. Petroleum grades insensibly into maltha, and this in turn into asphalt or solid bitumen. The term bituminous limestone is therefore applied to almost any limestone carrying hydrocarbon compounds having an asphaltic base, as distinguished from the paraffine base of many petroleum. Bituminous limestone is found at many localities in the United States, particularly in Indian Territory, California, and Arkansas. Its chief commercial use is as a paving material, but it also serves as a source of asphaltic products.

Bivalves, those mollusks of the class *Pelecypoda* (q.v.) whose coverings consist of two concave shell plates or valves.

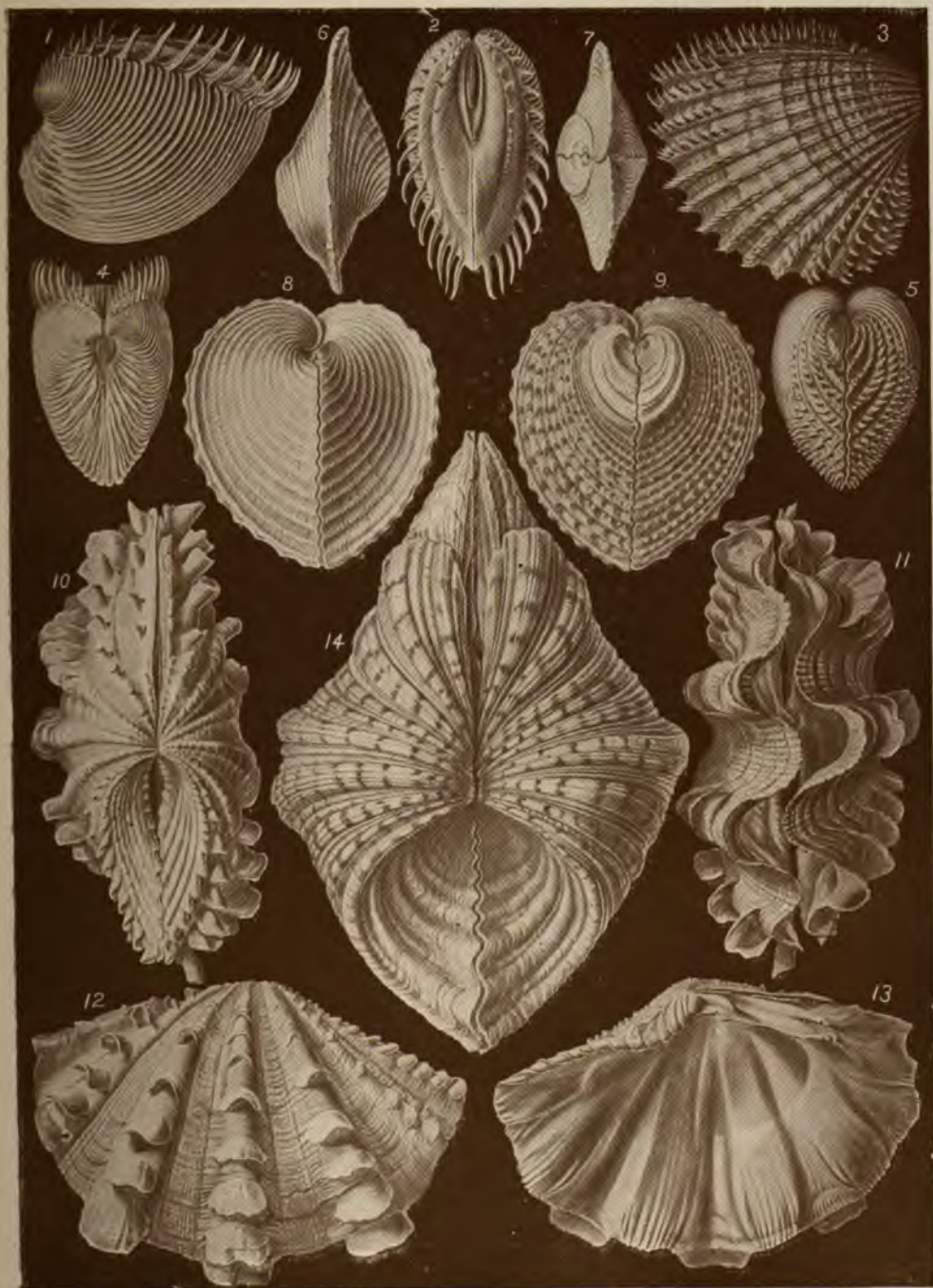
Bivalves, (for example, the clam) are entirely protected by the valves, which are connected by a hinge, consisting of a large tooth or teeth (usually three), and a ligament. In the clam both valves are alike, in the scallop the hinge margin is eared, and the shell is marked with radiating ridges, while in most bivalves there are simple lines of growth. On the interior, which is usually lined with mother-of-pearl, are either one (in oysters and scallops) or two (clams, etc.) roundish muscular impressions made by the single or the two adductor muscles by which the valves are closed. The shell is often covered by an epidermis. The hinge is situated directly over the heart, and is therefore dorsal or "hæmal." The shell is secreted by the thickened edge of the mantle or body-walls. There is in bivalves in distinction from snails (*Gastropoda*) no head, and the mouth is not armed with teeth or a lingual ribbon, present in snails. The mouth is small with soft lips, and in each side is a pair of labial palpi. The short œsophagus opens into a small stomach which receives the contents of the liver. The long intestine is coiled in the visceral mass, the solid disk-like portion of the body in the clam and oyster; the intestine also passes through the ventricle of the heart, and then ends opposite the upper division of the siphon. This heart is three-chambered, consisting of a ventricle and two auricles. The siphon forms the so-called head of the clam, though it is situated at the posterior end of the body; it forms a double tube, ending in an excurrent and incurrent orifice surrounded by a circle of tentacles which are sensitive to the touch. The siphon is very long in the clam (*Mya*) and other bivalves which burrow in the sand or mud and live in deep holes. Locomotion is effected by the

so-called "foot," which is a wedge-shaped or hatchet-shaped fleshy tongue-like mass situated at the front end under the mouth. Its hatchet-shape gives the name *Pelecypoda* to the class. This foot is enormous in the razor-fish, which burrows with extreme rapidity in the sand. In fixed bivalves, such as the oyster and mussel, the foot and siphon are reduced by atrophy or are entirely wanting. There being no head, there are usually no eyes, except in the scallops, where they are numerous, large, and situated on the thickened edge of the mantle. Bivalves breathe by one pair, more usually two pairs, of leaf-like gills; situated on each side of the visceral mass. The individuals are bisexual, each being male or female. The nervous system consists of three pairs of ganglia, connected by a nerve-thread. The supracœsophageal ganglion is the so-called "brain," being situated over the mouth; the pedal ganglion is in the centre of the foot, while the visceral ganglion is near the middle of the body. Most bivalves possess an organ of hearing or of equilibration, a very minute otocyst situated in the centre of the foot, and connected by a nerve with the pedal ganglion. The ovaries are yellowish, voluminous glands forming the larger part of the visceral mass. These mollusks are very prolific, the oyster laying about 2,000,000 eggs.

In the oyster (*Ostrea*) or in *Anomia* the shell is inequilateral, one valve, usually the left and lower one, being fixed to some object, and the intestine does not pass through the ventricle; in *Arca* the ventricle is double. In *Lucina* and *Corbis* there is but one gill on each side, and in *Pecten*, *Spondylus*, and *Trigonia* the gills are reduced to comb-like processes. Contrary to the habits of most bivalves, the scallop can skip over the surface of the water by violently opening and shutting its shell. *Trigonia* is also capable of leaping a short distance, while *Lima* is an active flyer or leaper. The American oyster is dioecious, while most mollusks are monœcious or hermaphroditic. The foot varies much in form; in the mussel, *Pinna*, *Cyclocardia*, and the pearl-oyster it is finger-shaped and grooved, with a gland for secreting a bundle of threads, the *byssus*, by means of which it is anchored to the bottom. The foot in the quahog, *Neulima* and *Clidophora*, is large, these mollusks being very active in their movements. In *Glycimeris* the fringe is toothless, much as in the oyster. In *Macra* the middle tooth of the hinge is large, the corresponding cavity large and triangular. In *Saxicava* and *Panopæa*, the pallial line is represented by a row of dots. In *Macoma* the siphons are very long.

Lithodomus, the date-shell, one of the mussels, bores into corals, oyster shells, etc.; the common *Saxicava* excavates holes in mud and soft limestone, as does *Gastrochæna*, *Pholas*, and *Petricola*. Certain boring lamellibranchs, such as *Pholas*, are luminous.

A very aberrant form of bivalve mollusk is *Clavagella*, in which the shell is oblong, with flat valves, the left cemented to the sides of a deep burrow. The tube is cylindrical, fringed above, and ending below in a disk, with a minute central fissure, and bordered with branching tubules. In *Aspergillum*, the watering-pot shell, the small bivalve shell is cemented to the lower end of a long shelly tube, closed below by a perforated disk like the nose of a watering-pot.



BIVALVE MOLLUSCA

1-3 *Cytheria dione*. 4, 5 *Cardium aculeatum*. 6-9 *Hemicardium cardissa*. 10-13 *Tridacua squamosa*. 14 *Hippopus maculatus*.

BIXBY — BLACAS

Bivalves, in growing, pass through a pre-swimming larval stage called a "trochosphere," resembling a top, and moved by a circle of cilia. After a while two flaps (*vela*) arise on each side of the mouth, forming the *veliger* stage; meanwhile the shells arise, and as they become larger and heavier, the young bivalve sinks to the bottom, and begins to use its "foot" for burrowing.

Some bivalves arrive at maturity in a single year. The fresh-water mussels live from 10 to 12 years, while the giant clam (*Tridacna gigantea*) probably lives from sixty years to a century.

The bivalves began to appear in the Cambrian Period; they became more frequent in the Ordovician and Silurian, but they did not abound until toward the Mesozoic Age, since the seas during the Palæozoic Age were crowded with brachiopods (q.v.). Oysters date from the beginning of the Mesozoic. The genus *Mucula* and its allies are very primitive forms, and nearly allied to the earliest known bivalves. Of about 15,000 known species of bivalves, two thirds (10,000) are fossil.

The class *Pelecypoda* (or *Lamellibranchiata*) is divided by the gill characters (see Parker and Haswell's Zoology) into five orders, namely: (1) *Protobranchia*, (2) *Filibranchia*, (3) *Pseudo-lamellibranchia*, (4) *Eulamellibranchia*, (5) *Septibranchia*; and by Dall, from the hinge-characters, into three ordinal groups: *Prionodesmacea*, *Anomalodesmacea*, and *Teleodesmacea*. In Neumayr's group *Palæoconcha*, now forming a part of the *Prionodesmacea*, are included certain primitive types which appear to have given origin to certain more modern groups. For further information and the literature of the subject see MOLLUSCA.

Bixby, James Thompson, American author and clergyman: b. Barre, Mass., 30 July 1843. He graduated at Harvard in 1864, and became a Unitarian minister. He has published: 'Similarities of Physical and Religious Knowledge' (1876); 'The Crisis in Morals' (1891); 'Religion and Science as Allies' (1895); 'Ethics of Evolution' (1900); 'The New World and the New Thought' (1902).

Bizet, Alexander Cesar Leopold, be-zā, a-léks-āndr sā-zār lā-ō-pöld (better known as **GEORGE BIZET**), French composer: b. Paris, 25 Oct. 1838; d. there, 3 June 1875. He studied with Halévy, whose daughter he married, and at the Paris Conservatory. His operas include: 'The Pearl Fishers' (1863); 'The Fair Maid of Perth' (1867); 'Djamileh' (1872); and 'Carmen' (1875), his most famous composition, which retains all its early popularity and is founded on Mérimée's novel of that name.

Bjerregaard, byēr-re-gård, Carl Henry Andrew, Danish-American writer: b. Fredricia, Denmark, 24 May 1845. He served five years in the Danish army, and came to America in 1873. He has been librarian of the Astor Library, New York, from 1879, and has written: 'Mysticism and Nature Worship'; 'Being and the Philosophical History of the Subject.'

Björnson, Björnstjerne, Norwegian novelist, poet, and dramatist: b. Kvikne, 8 Dec. 1832; d. 26 April 1910. He entered the

University of Christiania in 1852, and he speedily became known as a contributor of articles and stories to newspapers and as a dramatic critic. From 1857 to 1859 he was manager of the Bergen theatre, producing during that time his novel, 'Arne' (1858), and his tragedy of 'Halte Hulda.' He was at Christiania part editor of the *Aftenblad* in 1860, then lived several years abroad, and in 1866 became editor of the 'Norsk Folkeblad.' In 1869-72 he was co-director of a Copenhagen periodical, and much of his later life has been passed abroad. The democratic tendencies to be found in his novels have found a practical outcome in the active part taken by him in political questions bearing upon the Norwegian peasantry and popular representation. He was for a long period the leader of the Norwegian republicans, and the national entity symbolized by the change made in the Norwegian flag on 1 Jan. 1901 is more nearly due to him than to any one else. He was the greatest distinctively Norwegian writer of his day. In 1903 he was awarded the Nobel prize in literature. In 1880-1 he traveled and lectured in the United States. His dramas include: 'Sigurd Jorsalfar' (1872); 'Mary Stuart in Scotland' (1864); 'The Newly Wedded Pair' (1866); 'Sigurd Slembe' (1872); 'The Editor' (1874); 'A Bankruptcy' (1875); 'The King' (1877); 'Leonarda' (1879); 'The New System' (1879); 'A Glove' (1883); 'Beyond Our Strength' (1883); 'Geography and Love' (1885). His verse includes: 'Poems and Songs' (1870); 'Arnljot Gilline,' an epic (1870). Besides the pastoral tales: 'Arne' (1858); 'A Happy Boy' (1860); 'The Fisher Maiden' (1868); 'Synnøve Solbakken,' he has written the novels: 'The Bridal March' (1873); 'Magnhild' (1877); 'Captain Mansana' (1879); 'The Heritage of the Kurts' (1884); 'In God's Way' (1889); 'Absalom's Hair'; etc. See Boyesen, 'Essays on Scandinavian Literature' (1895); Gosse, 'An Essay on the Writings of Björnson' (1895); Brandes, 'Moderne Geister' (1897).

Bjornstjerna, byörn'shēr-na, Magnus Frederick Ferdinand, mäg-noos fréd'-ēr-ik fēr'-de-nand (COUNT), Swedish statesman and author: b. Dresden, 10 Oct. 1779; d. Stockholm, 6 Oct. 1847. He was educated in Germany, and in 1793 proceeded to Sweden to enter the army. At the storming of Dessau he received a severe contusion from a cannon-ball, but he was able, notwithstanding, to be present at the battle of Leipsic. He afterward concluded the capitulation of Lübeck with Gen. Lallemand, and received the surrender of the fortress of Maestricht. He concluded with Prince Christian Frederick at Moss the convention which was followed by the union of Norway and Sweden. He published 'The British Rule in the East Indies' and 'Theogony, Philosophy, and Cosmogony of the Hindoos' (1843).

Blacas, Pierre Louis Jean Casimir, blā-ka, pe-ār loo-e zhōn (DUC DE), French statesman: b. Aups, Var., 12 Jan. 1771; d. Kirchburg, Austria, 17 Nov. 1839. He was cabinet minister in the time of Louis XVIII., and a confidential adviser of the Bourbons; twice minister to Naples; ambassador to Rome to negotiate the *concordat* of 1817; went into exile upon the banishment of Charles X.; and offered the king his fortune, which was not accepted. He was so

BLACK

faithful to the Bourbons as to be unpopular with the people. He was a large collector of antiquities and founded the Egyptian Museum at Paris.

Black, Adam, Scotch publisher: b. Edinburgh, 20 Feb. 1784; d. there, 24 Jan. 1874. In 1808 he began business as a bookseller, and later with his nephew, Charles B. Black, established a publishing house in Edinburgh. Their most famous publications were: 'Encyclopædia Britannica,' and the 'Waverly Novels.' Adam Black was twice lord provost of Edinburgh, and in 1856-65 represented that city in Parliament. He declined the honor of knighthood, and a statue was erected in Edinburgh in recognition of his public services in 1877.

Black, Alexander, American author: b. New York, 7 Feb. 1850. He has published 'The Story of Ohio' (1888); 'Photography Indoors and Out' (1894); 'Miss Jerry' (1895); 'A Capital Courtship' (1897); 'Miss America' (1898); 'Modern Daughters' (1899); 'The Girl and the Guardsman' (1900).

Black, Charles Clarke, American lawyer: b. Mount Holly, N. J., 29 July 1858. He studied law and was admitted to the New Jersey bar in 1881. He has since practised in Jersey City, and has published 'Proof and Pleadings in Accident Cases' (1886); 'New Jersey Law of Taxation' (1893); 'Law and Practice in Accident Cases' (1900).

Black, Frank Swett, American lawyer: b. Limington, Me., 8 March 1853. He graduated at Dartmouth College in 1875; was editor of the *Journal* in Johnstown, N. Y.; studied law at Troy in the office of Robertson & Foster, and was admitted to the bar in 1879. He won much popularity by his activity in prosecuting the men who murdered Robert Ross in the election riots in Troy in 1892. In 1895-7, he was a member of Congress, and in 1897-9 governor of New York.

Black, James, American prohibitionist: b. Lewisburg, Pa., 23 Sept. 1823; d. 16 Dec. 1893. He joined a temperance society at the age of 17, and throughout his life was a determined advocate of prohibition and legislation for its enforcement. He was the first to propose the formation of a temperance party, was one of the committee that called a national convention to organize the Prohibition party (q.v.) and was elected its president when the convention met in Chicago, 1 Sept. 1869. At the Columbus, Ohio, convention, 22 Feb. 1872, he was made the first nominee of the party for President of the United States. His ticket received 5,608 votes in the election of that year. He published: 'Is There a Necessity for a Prohibition Party?' (1876); 'History of the Prohibition Party' (1880); 'The Prohibition Party' (1885).

Black, Jeremiah Sullivan, American jurist and statesman: b. Glades, Somerset county, Pa., 10 Jan. 1810; d. York, Pa., 19 Aug. 1883. At 17 years of age he entered the law office of Chauncey Forward, in Somerset, an eminent member of the bar, and was admitted to the courts in 1830, being still in his minority. In April, 1842, he was appointed by the governor president judge of the judicial district in which he resided, and confirmed by the Senate upon a strict party vote. In 1851, when a change in the

State Constitution made the judges elective, he was nominated as judge of the Supreme Court by the Democratic convention, before which he was not a candidate. Of the 10 candidates named by the two parties, he obtained the largest popular vote. Under the mode of drawing provided by the Constitution, a three years' term was assigned to him, and he became chief justice of the court. In 1854 he was re-elected to this place, by a majority of 47,000 votes, though the candidate for Governor on the same ticket was defeated by 37,000. On 5 March 1857, while engaged in the discharge of his judicial duties at Philadelphia, he received a telegraphic despatch from President Buchanan, tendering him the appointment of Attorney-General of the United States. He soon after appeared on behalf of the government, in a disputed land claim from California, involving an important principle upon which hundreds of similar cases depended. He achieved a great success, at once becoming famous as a jurist.

In December, 1860, Mr. Black succeeded Mr. Cass as Secretary of State. After the election of Lincoln, Judge Black retired to his law practice. In 1868, he was counsel for President Johnson in the famous impeachment trial. In 1877 he appeared as counsel for S. J. Tilden before the Electoral Commission. Besides a great jurist, Judge Black was a brilliant conversationalist, classical scholar, and powerful orator. His collected 'Essays and Speeches' were published in 1885.

Black, John Charles, American lawyer, soldier, and statesman: b. Lexington, Miss., 27 Jan. 1839. He entered the Union army in 1861 as colonel of the 37th Illinois Volunteers; was severely wounded in the service; and was brevetted brigadier-general. After the war he was elected Congressman-at-large from Illinois; was appointed commissioner of pensions by President Cleveland during the latter's first term, and United States attorney for the northern district of Illinois during his second term.

Black, Joseph, Scottish chemist: b. Bordeaux, France, 1728; d. Edinburgh, 6 Dec. 1799. He studied medicine, and in 1754 delivered a thesis, 'De Humore Acido a Cibus Orto et Magnesie Alba,' in which he ascribes the difference between the mild and caustic alkalies to the presence of fixed air (carbonic acid) in the former. The discovery of carbonic acid is of interest not only as having preceded the other gases made by Priestley, Cavendish, and others, but as having preceded in its method the explanation given by Lavoisier of the part played by oxygen in combustion. In 1756 he was appointed professor of medicine and lecturer on chemistry in the University at Glasgow; and in 1766 to the same chair in Edinburgh. No teacher inspired his disciples with such a zeal for study; his lectures, therefore, contributed much to make the taste for chemical science general in England. Upon Lavoisier's proposal, the Academy of Sciences in Paris appointed him one of its eight foreign members. Black did not adopt the Lavoisierian system until he was satisfied that it was more accurate than that of which he had been so long a teacher. In his later courses, however, he taught the anti-phlogistic system. His 'Lectures on Chemistry' appeared in 1803.

BLACK — BLACK-BELLIED PLOVER

Black, William, Scottish novelist: b. Glasgow, 13 Nov. 1841; d. Brighton, England, 10 Dec. 1898. He first studied art, but eventually became connected with the Glasgow press. In 1864 he went to London, and in the following year joined the staff of the *Morning Star*, for which he was special correspondent during the Austro-Prussian war of 1866. His first novel, 'Love or Marriage' (1868), was only moderately successful, but his 'In Silk Attire' (1869), 'Kilmeny' (1870), 'The Monarch of Mincing Lane,' and especially 'A Daughter of Heth' (1871), gained him an increasingly wide circle of readers. For four or five years he was assistant editor of the *Daily News*, but in 1874 his connection with journalism practically ceased. His other works include: 'The Strange Adventures of a Phæton' (1872), containing descriptions of scenery much praised by Ruskin; 'A Princess of Thule' (1873); 'The Maid of Killeena' (1874); 'Three Feathers' (1875); 'Madcap Violet' (1876); 'Green Pastures and Piccadilly' (1877); 'MacLeod of Dare' (1878); 'White Wings, a Yachting Romance' (1880); 'Sunrise' (1880); 'The Beautiful Wretch' (1881); 'Shandon Bells' (1883); 'Judith Shakespeare' (1884); 'White Heather' (1885); 'Sabina Zembla' (1887); 'The Strange Adventures of a House-Boat' (1888); 'In Far Lochaber' (1889); 'The New Prince Fortunatus' (1890); 'Wolfenberg' (1892); 'Highland Cousins' (1894); 'Briseis' (1896); and 'Wild Eelin' (1898). Black's novels have enjoyed much popularity especially in the United States. His subjects are drawn from many lands, but it is in dealing with the Scottish Highlands that he is at his best. He also wrote a 'Life of Goldsmith' for the English Men of Letters series. See Wemyss Reid, 'William Black, Novelist' (1902).

Black Acts. Acts of the Scottish Parliaments from 1424 to 1594, so called from their being printed in black-letter. The term "Black Act" is also applied to an act of George I. with reference to the "Blacks," a body of armed deer-stealers and poachers, who infested Epping Forest.

Black and Tan Terrier. See TERRIERS.

Black Art, the art or pretended art or practice of producing wonderful effects by the aid of superhuman beings or of departed spirits or the occult powers of nature. The reason why it was called black was that proficients in it were supposed to be in league with the powers of darkness. A large proportion of magical rites are connected with the religious beliefs of those using them, their efficacy being ascribed to supernatural beings. There is, however, a non-spiritual element in magic which depends on certain imagined powers and correspondences in nature, that can be utilized in various ways. In savage countries the native magician is often sorcerer and priest, and sometimes chief of the tribe. Among the ancient Egyptians magic was worked into an elaborate system and ritual, and it was regularly practised among the Babylonians and Assyrians, as well as in Greece and Rome. Alexandria, from the 2d to the 4th century, became the headquarters of theurgic magic, in which invocations, sacrifices, diagrams, talismans, etc., were systematically employed. This system, influenced by Jewish magical speculation, had a strong hold in

medieval Europe, and many distinguished names are found among its students and professors. The magic which still holds a place among the illiterate and ignorant classes has come down by tradition in popular folk-lore. The name natural magic has been given to the art of applying natural causes to produce surprising effects. It includes the art of performing tricks and exhibiting illusions by means of apparatus, the performances of automaton figures, etc. See ALCHEMY; ASTROLOGY; CHARM; DIVINATION; LEGERDEMAIN; WITCHCRAFT.

Black Ash, a mixture of 25 per cent of caustic soda with calcium sulphide, quicklime, and unburnt coal, obtained in the process of making sodium carbonate. The mixture of sodium sulphate, chalk, and powdered coal is fused in a furnace, gases escape, and the residue is the black ash, which is lixiviated with warm water, and the solution, evaporated to dryness, yields soda ash, an impure sodium carbonate. See SODIUM.

Black Assize, a judicial sitting of the courts held at Oxford in 1577, and rendered historical by the pestilential and deadly fever which was introduced into the court from the jail, and swept away judges, jurymen, and counsel, and extended itself into the town and neighborhood. The superstitions of the age invested it with a special character, and it was remarked that no women nor poor people died of it.

Black Bass, Duck, etc. See BASS; DUCK.

Black Beauty, His Grooms and Companions, a story by Anna Sewall. It is written in the form of a horse autobiography, and is really a tract on the proper treatment of horses. The story is told with simplicity and restraint, and its vogue has been great, and its influence very wide.

Black Beetle, the English name for a cockroach, especially the Oriental cockroach (q.v.); also less commonly for the dark-colored beetles of the bad-smelling genus *Blaps*.

Black-bellied Plover, or **Black-breast**, one of the largest of the American plovers (*Charadrius squatarola*), also known throughout the northern parts of the Old World, where it is known as "gray" or "Swiss" plover, and whence it goes in winter to all parts of the southern hemisphere. It breeds in the Arctic regions, and is known in the United States only in its spring and fall migrations which are carried along the coasts, so that the bird is rare throughout the interior. Great flocks sometimes visit England in autumn, spreading over cultivated fields, and remaining until the coming of frost. It is about 11.50 inches in length, and has a large round head, and large eyes, whence the gunner's names, "bullhead," "beetlehead," and "ox-eye." In general form it resembles the golden plover (q.v.), but has a distinct though small hind toe. The general aspect is gray, dusky on the back, with the throat, breast, and a large part of the abdomen black, and the tail barred with black; bill and feet black. It is a favorite object of sport, and the young migrants in autumn are delicious eating; but it is not as easily shot as most of the shore-birds. It breeds along the shores of the Arctic Ocean.

BLACK BELT—BLACK EARTH

Black Belt, an agricultural region of Alabama; 70 miles wide, extending entirely across the State, between 33° and 31° 40'; so called from the fact that the negroes greatly predominate in numbers, raising vast quantities of cotton from the richest of lands. It includes 17 counties, with over 500,000 inhabitants.

Black-cap, the name of various birds having the crown of their head black. In the United States it is given most often to the common titmouse, the chickadee (q.v.); and to a small fly-catching warbler, *Sylvania pusilla*, an olive and yellow bird with the top of the head crested with black. In England the common "black-cap" (*Curruca atricapilla*) is a small warbler, closely related to the nightingale, and one of the sweetest of European song-birds, which is frequently kept in cages.

Black Cat, an American fur-bearing animal.

Black Cockade, a badge first worn by the American soldiers during the Revolution, and later, during the hostility toward France occasioned by the X. Y. Z. Correspondence (q.v.), adopted by the Federalists as a patriotic emblem and as a rejoinder to the tri-colored cockade worn by the Republicans as a mark of affection toward France.

Black Co'hosh. See CIMICIFUGA.

Black Death, The, one of the most memorable of the epidemics of the Middle Ages, was a great pestilence in the 14th century, which devastated Asia, Europe and Africa. It was an Oriental plague, marked by inflammatory boils and tumors of the glands, such as break out in no other febrile disease. On account of these boils, and from the black spots (indicative of putrid decomposition) which appeared upon the skin, it has been generally called the Black Death. The symptoms were many, though all were not found in every case. Tumors and abscesses were found on the arms and thighs of those affected, and smaller boils on all parts of the body; black spots broke out on all parts of the skin, either single, united, or confluent. Symptoms of cephalic affection were frequent; many patients became stupefied and fell into a deep sleep, losing also their speech from palsy of the tongue; others remained sleepless, without rest. The fauces and tongue were black, and as if suffused with blood. No beverage would assuage the burning thirst. The plague spread with the greater fury as it communicated from the sick to the healthy; contact with the clothes or other articles which had been used by the infected induced disease, and even the breath of the sick, who expectorated blood, caused contagion far and near. As it advanced, not only men but animals fell sick and expired. In England the plague first broke out in the county of Dorset, whence it advanced through the counties of Devon and Somerset to Bristol, and thence reached Gloucester, Oxford and London. Probably few places escaped, perhaps not any, for the annals of contemporaries report that throughout the land only a tenth part of the inhabitants remained alive. From England the contagion was carried by a ship to Norway, where the plague broke out in its most frightful form, with vomiting of blood, and throughout the whole country spared not one third. The sailors found no refuge on their ships, and vessels whose crews had perished to the last man

were often seen drifting on shore. The whole period of time during which the Black Death raged with destructive violence in Europe was (with the exception of Russia, where it did not break out until 1351) from 1347 to 1350; from this latter date to 1383 there were various pestilences, bad enough, indeed, but not as violent as the Black Death. Ireland was much less heavily visited than England, and the disease seems scarcely to have reached the mountainous regions of that land; and Scotland, too, would perhaps have remained free from it had not the Scotch availed themselves of the discomfiture of the English to make an irruption into England, which terminated in the destruction of their army by the plague and the sword and the extension of the pestilence through those who escaped over the whole country. It may be assumed that Europe lost by the Black Death some 25,000,000 of people, or about one fourth of her entire population. That her nations could recover so quickly from this terrible loss without retrograding more than they did is a most convincing proof of the indestructibility of human society as a whole. In Hungary, and afterward in Germany, rose the brotherhood of the Flagellants, who undertook to expiate the sins of the people and avert the pestilence by self-imposed sufferings. While the wanderings of the Flagellants threw society into confusion, and helped to spread the plague, the horrors of the time were further heightened by the fearful persecutions to which the Jews were subjected, from a popular belief that the pestilence was owing to their poisoning the public wells. The people rose to exterminate the Hebrew race, of whom, in Mayence alone, 12,000 were cruelly murdered. They were killed by fire and by torture wherever they could be found, and for them to the terrors of the plague were added those of a populace everywhere infuriated against them. In some places the Jewish people immolated themselves in masses; in others, not a soul of them survived the assaults of their enemies. No adequate notion can be conveyed of these horrors. To aggravate the pestilence, the poison-panic made the people shut up their wells. With terror of poison and of plague in a state of society rude at the best, but now disorganized, what means were available to mitigate or prevent the sufferings of the people were rendered altogether nugatory.

Black Duck. See DUSKY DUCK.

Black Earth, a deposit in South Russia, extending over the steppes that border on the Black Sea, and the depressed area to the north of the Caspian, with a breadth from north to south of from 200 or 300 to nearly 700 miles. It varies in color from dark brown to black, and in thickness from a foot or two up to six or seven yards, occasionally reaching, it is said, even to 60 feet. It is composed chiefly of siliceous sand (about 70 per cent), alumina and other ingredients (23 per cent), and organic matter (about seven per cent). It appears to be unfossiliferous. It bears the same relation to the glacial accumulations of Russia that the loess of the Rhine, the Danube, etc., does to those of central Europe, and is probably the fine-grained silt derived from the torrents and flooded rivers that escaped from the melting snows and glaciers of the glacial period. According to some geologists, however, it may

BLACK-EYED SUSAN—BLACK FRIDAY

owe its origin to the action of the wind. It is supposed by them to be simply an accumulation of wind-blown dust—the finely sifted material being fixed by the abundant grasses of those steppe regions.

Black-eyed Susan, the name of a once popular comedy by Douglas Jerrold. It appeared in 1829 and was founded on Gay's ballad 'Sweet William's Farewell to Black-Eyed Susan.'

Black Flags, an organization of Chinese rebels who established themselves in the Red River valley in Tonquin, after the suppression of the Taiping Rebellion in southern China (1850-4). From their warlike character and desperate deeds they were called Black Flags as distinguished from the peaceable Yellow Flags. They assisted the Tonquinese and Chinese in opposing the French wars (1873, 1882, and 1885), with signal results. Their principal object was plunder. They were responsible for the appalling massacre, in 1884, of French missionaries and native Christians, to the number of 10,000.

Black Fly, a species of the genus *Simulium*, the common black fly of northern New England, Canada, and Labrador probably being *S. molestum*. In this tormenter of travelers and fishermen the body is short and thick, the labrum is free, sharp as a dagger, and the proboscis is well developed and draws blood profusely. It is black, with a broad silvery ring on the legs. The species are numerous.

The cylindrical larva is furnished with short antennæ, and near the mouth are two flabelliform appendages. The pupa has eight very long lateral filaments on the front of the thorax, and the posterior end of the body is enclosed in a semi-oval membranous cocoon, open in front, and posteriorly attached to some submerged plant such as eel-grass. The fly leaves the pupa beneath the water. She deposits her eggs on the rocks in a compact layer a few inches above the surface of the water. The eggs of the Hungarian or "Columbaz midge" are enveloped in a yellowish-white slime and deposited at the end of May or early in June upon stones or grass over which water flows, or in the brooks of the more elevated regions. The number laid is variously estimated at from 500 to 5,000. The food of the larva of the buffalo-gnat has been proved to be carnivorous, and it is supposed that the larvæ of all the species live on animal matter, though possibly in some cases on dead leaves. On hatching the larvæ become attached to plants, etc., or to each other, by a silken thread, forming long floating strings. When the fly issues from the submerged pupa-case she rises to the surface, then being protected by a fine silky covering of hairs. The adult fly in central New York issues about the first of April, and those apparently of a new brood the first of June; after this there is a succession of generations throughout the season; the development of a single brood occupying about two months. The larva hibernates.

While the black fly of Maine, and presumably of Labrador, is of the species *S. molestum*, that of the St. Lawrence valley has been named *S. invenustum*, and is said to be different from that of Lake Superior. A remarkably large species is known as *S. pictipes*; its larvæ

and pupæ were found in the rapids of the Au Sable River, and also similar ones on the north shore of Lake Superior.

The black fly is mostly active in the bright sun-light, mostly disappearing on cloudy days, but it is known to crawl under one's clothes and to bite in the night. The bite is often severe, the creature leaving a large clot of blood behind it. The best preventive is oil of tar, and the use of various ointments.

Black Forest (German, *Schwarzwald*), a chain of mountains in the grand-duchy of Baden and the kingdom of Württemberg. It runs almost parallel with the Rhine, from south to north, often only from 15 to 20 miles distant; is about 85 miles long, and from east to west in the southern part about 30 miles wide; in the northern about 18. The Danube, as well as many other rivers, rises in these mountains. Those on the west side run into the Rhine; those on the east side into the Danube. The Black Forest is rather a chain of elevated plains than of isolated peaks. The highest summit, the Feldberg, measures 4,900 English feet. Except from June to September, these mountains are generally covered with snow, and even during this period are not entirely free from it. Among the many valleys of this chain, the Murgthal is particularly celebrated for its beautiful scenery. The whole chain consists of primitive mountains: its skeleton throughout is granite; its higher points are covered with sandstone, and other layers of less consequence. On the western side, at the foot, appears gneiss. Porphyry and clay-slate are found on several heights, as likewise silver, lead, copper, iron, cobalt, and other minerals. The forests are extensive, and consist mostly of pines and similar species. The raising of cattle is the principal branch of husbandry carried on in this district. The ground is not fertile, and the inhabitants scattered over the mountains live very frugally, and are very industrious. The vast quantity of timber growing here has long been a considerable source of revenue. The timber of the Black Forest was always highly prized by the Dutch, and the export to Holland is still largely carried on, the trees being conveyed down the Rhine in the form of rafts. Many saw-mills are kept at work cutting up the timber; and the forests also give employment to charcoal-burners, potash-boilers, etc. The manufacture of the well-known wooden clocks, toys, etc., is another important branch of industry, in which many persons are employed. Watches are also made, as well as orchestrons and other musical instruments. Neustadt, Friberg, Hornberg, and Furtwangen are central points of the manufacture of wooden wares, the commerce in which embraces all Europe, and extends to America and Australia.

Black Friars, friars of the Dominican order: so called from the color of their habit. See DOMINICANS; ORDERS, RELIGIOUS.

Black Friday, the name given in the United States to two days that ushered in financial panics. First, Friday, 24 Sept. 1869, when the attempt of Jay Gould and James Fisk, Jr., to create a corner in the gold market by buying all the gold in the banks of New York city, amounting to \$15,000,000, culminated. For several days the value of gold had risen steadily, and the speculators aimed to carry it from 144 to 200. Friday the whole city was in a ferment.

BLACK GUM—BLACK HOLE OF CALCUTTA

the banks were rapidly selling, gold was at 162½, and still rising. Men became insane, and everywhere the wildest excitement raged, for it seemed probable that the business houses must be closed, from ignorance of the prices to be charged for their goods. But in the midst of the panic it was reported that Secretary Boutwell of the United States treasury had thrown \$4,000,000 on the market, and at once gold fell, the excitement ceased, leaving Gould and Fisk the winners of \$11,000,000. The second was 19 Sept. 1873, when numerous failures on the New York Stock Exchange precipitated the panic of 1873.

The term was first used in England, being applied in the first instance to the Friday on which the news reached London, 6 Dec. 1745, that the young pretender, Charles Edward, had arrived at Derby, creating a terrible panic; and finally to 11 May 1866, when the failure of Overend, Gurney & Company, London, the day before was followed by a widespread financial ruin. Good Friday is also known as Black Friday in some countries, because of the use of black vestments and draperies in the churches.

Black Gum, Sour Gum, or Pepperidge. See TUPELO.

Black Hawk, chief of the Sac Indians: b. Kaskaskia, Ill., 1767; d. near Fort Des Moines, 3 Oct. 1838. He was made chief of the Sacs in 1788; and in 1804 repudiated the first agreement made by the Sacs and Foxes with the United States to give up their lands east of the Mississippi. The possession of the territory was disputed for a number of years; in 1823 the majority of the two tribes moved across the river, and a treaty with the United States, ceding the disputed territory, was signed in 1830. Black Hawk, however, objected to the whites occupying the vacated territory, and in June 1831, he began the Black Hawk war by crossing the Mississippi with a small force and attacking some Illinois villages. Driven off by the militia under Gen. Gaines, he returned in the spring of 1832 with a larger force and began to massacre the white settlers. The Indians were however defeated by United States troops in two battles near the Wisconsin River, 21 July 1832, and near the Bad-Axe River, 1-2 Aug. 1832. The war was brought to an end by the surrender of Black Hawk in the latter part of August. He was kept a prisoner till 1833, then rejoined his tribe on their reservation, near Fort Des Moines.

Bibliography.—Drake, 'Life of Black Hawk'; Patterson, 'Life of Black Hawk'; Snelling, 'Life of Black Hawk'; Thwaite, 'Story of the Black Hawk War' (Wisconsin Historical Society 'Papers' Vol. XII.).

Black-Hawk War. See BLACK HAWK.

Black Hills, a region in South Dakota, extending into Wyoming. It was purchased from the Indians in 1876, for whom it had been one of the finest hunting grounds in the West. In 1877-8 thousands of miners went there, and in 1880 there had already sprung into existence three towns, Deadwood, Central City, and Leadville. Around these lay also groups of smaller towns and villages. From 1880 the gold mines yielded about \$4,000,000 annually, and the silver mines about \$3,000,000 annually. The region is also rich in copper, lead, iron and mica. The

soil is fertile and the hills have abundant facilities for the grazing of cattle. Thrifty farmers have settled there, and many of them have good farms and fine improvements. Good school-houses have also been built in different settlements. See SOUTH DAKOTA.

Black Hole of Calcutta, a small chamber, 20 feet square, in Fort William, Calcutta. On the capture of Calcutta by Surajah Dowlah, 20 June, 1756, the English garrison, consisting of 146 men, under the command of Mr. Holwell, were locked up for the night in the common dungeon of the fortress, a strongly barred room, 18 feet square, and never intended for the confinement of more than two or three men at a time. There were only two windows, and a projecting veranda outside and thick iron bars within materially impeded what little ventilation there might be, while conflagrations raging in different parts of the fort gave the atmosphere an unusual oppressiveness. The unhappy creatures, exhausted with previous fatigue, were packed so tightly in their prison that it was with difficulty the door could be closed. A few moments sufficed to throw them into a profuse perspiration, the natural consequence of which was a raging thirst. One of the soldiers stationed in the veranda was offered 1,000 rupees to have them removed to a larger room. He went away, but returned saying it was impossible. The bribe was then doubled, and he made a second attempt with a like result; the nabob was asleep, and no one dared wake him. By nine o'clock several had died, and many more were delirious. A frantic cry for water now became general, and one of the guards, more compassionate than his fellows, caused some to be brought to the bars, where Mr. Holwell and two or three others received it in their hats, and passed it on to the men behind. In their impatience to secure it nearly all was spilt, and the little they drank seemed only to increase their thirst. Self-control was soon lost; those in remote parts of the room struggled to reach the window, and a fearful tumult ensued, in which the weakest were trampled or pressed to death. They raved, fought, prayed, blasphemed, and many then fell exhausted on the floor, where suffocation put an end to their torments. About 11 o'clock the prisoners began to drop off fast. At length, at six in the morning, Surajah Dowlah awoke, and ordered the door to be opened. Of the 146 only 23, including Mr. Holwell (from whose narrative, published in the 'Annual Register' for 1758, the account of this event is partly derived), remained alive, and they were either stupefied or raving. Fresh air soon revived them, and the commander was then taken before the nabob, who expressed no regret for what had occurred, and gave no other sign of sympathy than ordering the Englishman a chair and a glass of water. Notwithstanding this indifference, Mr. Holwell and some others acquit him of any intention of causing the catastrophe, and ascribe it to the malice of certain inferior officers, but many think this opinion unfounded. Holwell and three others were sent prisoners to Muxadavad; the rest of the survivors obtained their liberty, and the dead bodies were carelessly thrown into a ditch. The Black Hole is now used as a warehouse, and an obelisk, 50 feet high, was erected in memory of the victims.

BLACK JACK—BLACK RIVER

Black Jack. 1. A term loosely applied by miners to blende, the sulphuret of zinc, or to any other ore which resembles it in being obnoxious to them, if in no other respect.

2. One of several small oak trees of the southeastern coast, especially *Quercus Marylandica*, which has a rough, dark, scaly bark, and peculiar broadly wedge-shaped 3-5 lobed leaves, dark green and lustrous above, and somewhat rusty beneath.

Black Knight, The, a name given by romantic writers to various heroic characters. In Scott's 'Ivanhoe' Richard Cœur de Lion masquerades as the Black Knight. The Knight Esplandian, son of Amadis of Gaul and Oriana, is also so called. In the Arthurian legend the Black Knight, Sir Perceval, was one of the four brothers who kept the passage of Castle Dangerous.

Black Law, in the United States the name given to certain laws in force before the Civil War in many of the northern and border States discriminating against free negroes who might become citizens. Such laws excluded negroes from the public schools and from the militia, forbade them to testify in court against a white man, or in any case in which a white man was interested.

Black Lead. See GRAPHITE.

Black Letter, that variety of type otherwise designated Gothic, and which in a modified form is the ordinary type made use of in Germany, although in recent years there has been a tendency to employ the Roman letter, the Gothic type being considered injurious to the eyes. The earliest printed books were in black letter. See PRINTING.

Black Lilly. See FRITILLARY.

Black List, a list of bankrupts or other persons whose names are officially known as failing to meet pecuniary engagements. The term is also applied to a list of employees who have been discharged by a firm or corporation and against whom some objection is made and reported to other firms or corporations to prevent them obtaining employment. Blacklisting is made a punishable offense by the laws of some States. See Eddy, 'Laws of Combinations' (1901).

Black Monday. (1) A name for Easter Monday, in remembrance of the dreadful experiences of the army of Edward III., before Paris, on Easter Monday 14 April 1360. Many soldiers and horses perished from the extreme cold. (2) The 27th of February, 1865, a memorable day in Melbourne, Australia, when a destructive sirocco prevailed in the surrounding country.

Black Mountains, the culminating group of the Appalachian system, named from the dark growth of balsam-firs and other evergreens which cover their summits. Their position is in Yancey and Buncombe counties, North Carolina, between the main central ridges on the west and a portion of the Blue Ridge on the east. Unlike the other ridges of the Alleghanies, they lie for the most part transverse to the general trend of the range, and give this direction to the great valleys and rivers included between them. They rise from a district of great elevation, the height of the valley at Asheville, on the French Broad River, being about 2,000 feet above the sea, and that of Toe River, at Burns-

ville, Yancey County, about 2,500 feet. From this plateau the drainage is toward the Ohio in a northerly direction by the branches of the Great Kanawha, by those of the Holston and the French Broad toward the southwest, and by those of the Yadkin and the Catawba into the Pedee and Santee toward the southeast. This position at the sources of streams flowing in such diverse directions, long since pointed out this district as probably the most elevated east of the Rocky Mountains. The chief peaks are Mitchell, 6,710, and Clingman's Peak, Guyot's Peak, or Balsam Cone, Sandoz Knob, Hairy Bear, Cat Tail Peak, Gibbe's Peak, Sugar Loaf, or Hallback Peak, Potato Top, Black Knob, Bowler's Pyramid, Roan Mountain, all of which are above 6,500 feet in height.

Black Prince (EDWARD, PRINCE OF WALES), the son of Edward III. of England. He is thus styled in history by reason of the color of his armor. He died in 1376 and his son became king in 1377 as Richard II.

Black-quarter, an apoplectic disease which attacks cattle, indicated by lameness of the fore-foot, one of the limbs swelling, and after death being suffused with black blood, which also is found throughout the body. The disease, which chiefly attacks young cattle, is due to undrained fertile pasture, or to the too rapid transference of the cattle from poorer to richer soils. It is difficult to cure, but may be prevented by thorough draining or by giving regular doses of nitre to all the animals. The usual treatment consists in blood-letting, cutting into the swollen parts, and administering first nitre and afterward ammonium acetate and purgatives. In the United States the disease is especially prevalent in Texas, Kansas, Nebraska, South Dakota, and Colorado.

Black Republic, a name applied to the Republic of Haiti, which is under the dominion of the African race.

Black Republicans, a name applied to those members of the Republican party, who resisted the introduction of slavery into any State where it was not already recognized.

Black River, the name of several American rivers. (1) A river which rises in New York in Herkimer County, and after passing through Oneida and Lewis counties, changes its course at a place called Great Bend, passes by Watertown, and flows through Black River Bay into Lake Ontario. Near Turin, in Lewis County, it has a fall of about 63 feet. Below the fall, it is navigable to Carthage, a distance of 40 miles. The whole length of the river is 125 miles, and its breadth at Watertown (six miles from its mouth) is 60 yards. (2) A river of Missouri and Arkansas, also known as the Big Black River, the largest affluent of White River. It rises in the southeastern part of the former State, takes a southerly course, enters Arkansas, and joins the White River 40 miles below Batesville. During nine months of the year it is navigable for a distance of 100 miles from its mouth. Its entire length is about 400 miles. Trout and other excellent fish are caught in its waters in great abundance. (3) A river of Wisconsin. It rises in Marathon County and enters the Mississippi 15 miles above La Crosse, after a course of 225 miles. (4) A river of Vermont which rises in the town of Plymouth and

BLACK RIVER FALLS — BLACKADDER

■ a tributary of the Connecticut. Its abundant water power is utilized by various manufacturing along its course. (5) A portion of the Washita River in Louisiana between the mouth of the Tensaw River and the Red River; also sometimes styled Black River.

Black River Falls, Wis., a city and the county-seat of Jackson County, 171 miles north of Milwaukee. A fine water power is afforded by the falls of the Black River, and there are flour and lumber mills, wagon and other factories, foundaries, machine shops, and nurseries. There are iron mines in the neighborhood, and kaolin deposits from which fire-brick are manufactured. Pop. (1910) 1,917.

Black Rock Desert, a tract of nearly 1,000 square miles, north of Pyramid Lake, in Nevada. In summer it is a barren level of alkali and in winter covered in places with shallow water. Called also "Mud Lakes."

Black Rod, Usher of the, an officer of the House of Lords, appointed by letters patent from the Crown, and employed to execute orders for the commitment of parties guilty of breach of privilege and contempt, to assist at the introduction of peers and other ceremonies; and to summon the Commons to attend in the House of Lords when the royal assent is given to bills. His proper title is gentleman-usher of the black rod; that of his deputy, yeoman-usher.

Black Rood of Scotland, a cross of gold in the form of a casket, alleged to contain a piece of the true Cross. It was brought to Scotland in the 11th century by Margaret, queen of Malcolm III.; was bequeathed as an heirloom, and regarded as a sacred relic. It was delivered to Edward I. in 1291, but restored to Scotland after the Peace of Northampton in 1328. It was finally taken in battle by the English in 1346, and hung in the Cathedral of Durham until the Reformation, when it disappeared.

Black Saturday, 4 Aug. 1621; so called in Scotland because a violent storm occurred at the very moment the parliament was sitting to enforce episcopacy on the people. The name has also been applied to 10 Sept. 1547 on which date the disastrous battle of Pinkie was fought.

Black Sea (Lat. *Pontus Eurinus*), a sea situated between Europe and Asia, and bounded on the west by Turkey, Bulgaria, and Rumania, northwest, north and east by the Russian dominions, and on the south by Anatolia (Asia Minor), being connected with the Mediterranean by the Bosphorus, and with the Sea of Azov by the Strait of Yenikale. The area of the Black Sea and the Sea of Azov amounts to 168,500 square miles. The water is not so clear as that of the Mediterranean, and, on account of the many large rivers which fall into it,—the Danube, Dniester, Dnieper, Don, Kuban, etc.,—being less salt, freezes more readily. The tempests on this sea are sometimes tremendous in winter, as the land which confines its agitated waters gives to them a kind of whirling motion; but being practically clear of islands and rocks its navigation is not difficult on the whole. In 1854 one of its tremendous storms occasioned a very serious loss to the shipping of the allied British and French. The fisheries in the Sea of Azov and the Black Sea are not unimportant, various kinds of valuable fish both large and

small being taken; among others, several species of sturgeon. Caviare is made on the coast, as well as fish-glue, fish-oil, and, from the spawn of the sea mullet, botargo. The chief ports are Odessa, Kherson, Nicolaiev, Sebastopol, Novorossisk, Batoum, Trebizond, Samsun, Sinope, and Varna. It contains no islands of any note. After the capture of Constantinople (1453) the Turks excluded all but their own ships from the Black Sea till 1774, when the Russians obtained the right to trade in it, the same right being accorded to Austria in 1784, and to Britain and France in 1802. The preponderance thereafter gained by Russia was one of the causes of the Crimean war, by which she was compelled to cease keeping armed vessels on it, the sea being declared neutral by the Treaty of Paris in 1856. In 1871, however, the sea was deneutralized by a conference of the European powers (France being unrepresented) at London in response to a protest from Russia.

Black Tin, tin ore when dressed, stamped, and washed ready for smelting, forming a black powder. See TIN.

Black-vomit, a form of vomiting occurring usually in severe cases of yellow fever, due to the presence of blood in the stomach. See YELLOW FEVER.

Black Wad, an ore of manganese, used in making chlorine gas and as a drying ingredient in paints. It is an earthy variety of the dioxide found in low-lying districts, and is often mixed with oxides of cobalt or copper.

Black Walnut. See WALNUT.

Black Warrior, an American merchant vessel, seized and confiscated by Cuban customs officers in May 1854. This seizure was used as an excuse for proposed filibustering expeditions against Cuba. Spain, however, made compensation for the seizure.

Black Warrior, a river of Alabama, formed by the confluence of the Locust and Mulberry forks. It flows into the Tombigbee near Demopolis, after a course of 300 miles, and is navigable in its lower course to Tuscaloosa.

Black Watch, The, a famous British regiment, originating as a body of Highlanders, raised about 1668, for the purpose of keeping the peace in the Highlands, and so named from their dark dress. They were embodied in the regular army under the title of the 42d regiment in 1739. It first distinguished itself in the battle of Fontenoy (1745). From 1750 till 1767 the regiment was in America, and on its return it received the title of Royal Highlanders. It again served in America during the War of Independence; and in 1801 it particularly distinguished itself in Egypt at the battle of Alexandria. The Black Watch was also present at Napoleon's final defeat in the battle of Waterloo. It has gained special mention for its conduct at the Alma, in the Ashantee war, and at Tel-el-Kebir. The regiment was practically annihilated in the Boer war in 1901. Few English regiments surpass them for number of engagements or battle honors.

Black Water State, a popular nickname for Nebraska.

Blackadder, John, Scottish preacher: b. 1615; d. December 1685. He entered the Presbyterian ministry and when, in 1662, the episcopal



WHITE BLACKBERRY, "ICEBERG."

BLACKBERRY — BLACKBIRD

form of church government was forced upon a people who were generally repugnant to it, Blackadder, so far from complying with the new system, employed himself for several successive Sundays in exposing what he considered its unlawfulness, and, in his own words, entered his "dissent in heaven" against it. He was obliged to demit his charge in favor of an Episcopal incumbent, and in 1670, having performed worship at a conventicle near Dunfermline, where the people had armed themselves for self-defense, he was summoned before the privy council, but contrived to elude their power. On one occasion he preached at Kinkell, near St. Andrews; the people flocked from the metropolitan city to hear him, notwithstanding all the injunctions and surveillance of Archbishop Sharpe. It is said, that on Sharpe desiring the provost to send out the militia to disperse the congregation, he was informed that it was impossible—the militia had gone already as worshippers. After spending several months in Holland, in 1680 he returned to Scotland, and in the succeeding year was apprehended, and confined in the state prison upon the Bass Rock, where he died. See Crichton, 'Life of Blackadder' (1823).

Blackberry, various species of *Rubus* (q.v.), in which the drupelets adhere to the receptacle after ripening. Two general types are common: the trailing or dewberry (q.v.), and the upright, which is more generally known as the blackberry. The leading or representative species of this group is the very variable *R. nigrobaccus* (*R. villosus* of some botanists), which since 1841, when the first variety was introduced, has developed numerous varieties and has become in America, but not elsewhere, an important commercial fruit. It is used chiefly as a dessert fruit, but is also preserved, canned and evaporated. The plant thrives best on a northern slope and on rather heavy, loamy soils retentive of moisture but well drained. The soil must not be rich in nitrogenous food, since this tends to increase wood at the expense of fruitfulness. On light soils the plants are likely to suffer from lack of moisture in dry seasons. Potash fertilizers are required in abundance. Plants are usually propagated from root cuttings or suckers, and when one season old the smaller varieties are set in the field usually three by eight feet apart, the larger four by ten or else in checks six by six feet or more. When set in checks cultivation may be given both ways. For cultivation, diseases, etc., see **RASPBERRY**. In Europe the bramble (*R. fruticosus*) is called the blackberry. It is not extensively cultivated. Consult: Bailey and Miller, 'Cyclopædia of American Horticulture' (1900-2); Card, 'Bush Fruits' (1901).

Blackberry Lily (**LEOPARD FLOWER**) (*Belamcanda punctata*), a perennial herb, out of the two species of its genus of the natural order *Iridaceæ*, native of Japan and China and long cultivated as a garden plant for its orange, red-spotted flowers. Its popular names were suggested by the blackberry-like clusters of roundish seeds and the spotted flowers. The seed stalks are occasionally used for decoration with dried grass. The seeds may be sown in a sunny place where the soil is light and rich, and in after years the root-stocks may be divided.

Blackbird, the name given to two distinct species of birds: (1) The American grackles (q.v.) of the family *Icteridæ*, which consists of about a dozen species differing in size and color. (2) The English song-thrush or "merle." Four species are known in the eastern States, namely: the purple grackle, and rusty grackle, the red-winged blackbird, and the cow-bird.

The most familiar American one is the crow-blackbird, more properly termed purple-grackle, because of the iridescent or metallic gloss on its plumage. This bird is found throughout the entire East, and as far west as Dakota. It is the largest variety, being 12 inches in length. In the spring flocks of these grackles are found among the advance guard of the returning hosts of the homeward-bound migrants, although many remain in the southern States throughout the entire winter season. Their nests, located along the edges of the swamps, are rude, strong structures of sticks and reeds, placed among the branches of bushes, in the tops of tall pine trees, or in holes of old tree-stumps. The eggs are remarkably varied in size, shape and color, some being pointed, others long and slender, while others are nearly globular, the length averaging about 1.25 by .90 of an inch. The color is any shade of dirty white, light-blue or green, and the markings consist of confused blotches, scratches, and straggling lines of various dark tints. A bird similar in its habits and mode of life to the purple-grackle is the rusty blackbird, lacking only the metallic hues, its plumage being rusty black. The marshes where they breed are great centres of blackbird population, and there they collect in great flocks of young and old as the end of the season approaches. At this time they visit any neighboring fields of Indian corn, sometimes in hordes, to tear open the husks, feed upon the milky kernels, and make themselves obnoxious to the farmers, although, indisputably, they are, on the whole, beneficial by their destruction of insects. The red-winged blackbird (*Agelaius phoeniceus*), a variety of which is also found on the Pacific coast, varies in color from the bird of the eastern States, in the fact that it has on the wing a dark, blood-red patch, bordered with pure white, the other possessing only the scarlet patches on each shoulder, from which it takes its name. The nests of the red-winged blackbird are placed near the ground, among reeds or in small bushes and swamps. The eggs are smaller and lighter in color than those of the grackle, but resemble them in the scrawled markings. The French-Canadians call them "officer-birds." The impression upon the beholder, as he gazes at the prodigious flocks of tens of thousands of these red-epauleted blackbirds, when gathered upon the marshes preparing for the fall migrations, and wheeling in regular lines as they fly, their epaulets glistening in the sun, is that of an army of soldiers. Besides these, there is found in the middle west the handsomest of the family, the yellow-headed blackbird (*Xanthocephalus xanthocephalus*), in which the whole head and throat are rich orange-yellow. The females of many species are strikingly contrasted in plumage to their mates, having only a streaked brown dress instead of glossy black and red or yellow of the males. The young resemble the females in their protected dullness of plumage. For the English Blackbird, see **SONG THRUSH**. For the cow-bird, see **COW-BIRD**.

BLACKBREAST—BLACKFISH

The name is given to various other birds, prevalingly black in plumage, as, for example, to the bobolink (q.v.), which is called "skunk blackbird," because of the resemblance in its black and white markings to those of a skunk; and to the ani of Florida and the West Indies, which is commonly termed "savanna blackbird."

See Baird, Brewer and Ridgway, 'North American Birds' (Boston 1874); Ingersoll, 'Wild Life of Orchard and Field' (1902).

Blackbreast, a local name among American sportsmen for (1) the black-bellied plover (*Charadrius squatarola*); (2) the dunlin (*Tringa alpina*), also called "blackheart."

Blackbuck, the common small antelope (*Antelope cervicapra*), of the plains of India and Assam. This is the typical antelope, with horns from 16 to 20 inches long, rising in an elegant spiral from the top of the head. The body is blackish brown above, sharply contrasted with white on the under parts, and with a conspicuous white ring around each eye. These handsome little antelopes go about ordinarily in family parties, but sometimes gather in large herds, and are a favorite object of sport in India, where they are usually chased on horseback with greyhounds—sometimes also with the cheeta (q.v.), or by the aid of falcons. They are so swift that the best of dogs are required to catch them. They continue numerous because they are never hunted by the native Hindus, on account of religious prejudices. Consult: Baker, 'Wild Beasts and Their Ways,' and other writers upon the sport and natural history of India.

Blackburn, Henry, English journalist and art critic: b. Portsea, 15 Feb. 1830. He was educated at King's College, London. Beside contributions to newspapers and magazines, he has written 'Life in Algeria' (1864); 'Art in the Mountains: the Story of the Passion Play in Bavaria' (1870); 'Breton Folk' (1879); etc.

Blackburn, Joseph Clay Styles, American lawyer: b. Woodford County, Ky., 1 Oct. 1838; was graduated at Centre College, Danville, Ky., in 1857; admitted to the bar in 1859, and practised in Chicago. During the Civil War he served in the Confederate army, and after the war resumed practice in Kentucky. In 1871 he was elected to the Kentucky legislature, and in 1874 to Congress; and was a United States Senator in 1885-97 and again elected for the term 1901-7. During the presidential campaign of 1896 he was a leader in the free coinage silver movement.

Blackburn, Luke Pryor, American physician: b. Fayette County, Ky., 16 June 1816; d. 14 Sept. 1887; was graduated at Transylvania University, Lexington, Ky., in 1834, and began practising in that city. When cholera broke out in the town of Versailles he went there and gave his services free during the epidemic. In 1846 he went to Natchez, Miss., and in 1848, when yellow fever appeared in New Orleans, as health officer of Natchez, he originated the first quarantine against New Orleans that had ever been known in the Mississippi valley. During the Civil War he was a surgeon on the staff of Gen. Price. In 1875, when yellow fever broke out in Memphis, he hastened to the city and organized a corps of physicians and nurses, and in 1878 gave his services to the yellow fever

sufferers at Hickman, Ky. He was elected governor of Kentucky in 1879. He founded the Blackburn Sanitarium for Nervous and Mental Diseases in 1884.

Blackburn, William Maxwell, American Presbyterian clergyman and educator: b. Carlisle, Ind., 31 Dec. 1828; d. 1900. He became president of the University of North Dakota in 1884 and of Pierre University, South Dakota, in 1885, and president-emeritus of the last (now Huron College) in 1898. He wrote 'St. Patrick and the Early Irish Church'; 'Admiral Coligny and the Rise of the Huguenots'; 'History of the Christian Church,' etc.; and the 'Uncle Alick' series of juvenile stories.

Blackburn, England, a municipal, parliamentary, and county borough in Lancashire, 21 miles north-northwest from Manchester. There is a free grammar school, founded by Queen Elizabeth in 1557; a free school for girls, founded by William Leyland in 1765; a technical school, and a free library. The town-hall, infirmary, exchange, municipal offices, county court, county police station, opera house, library and museum, and union workhouse are all modern and handsome buildings. There are two public parks, one beautifully situated on the declivity of Revidge Hill. The railways all converge, and pass through one large railway station belonging to the Lancashire & Y. Ry. Company. The corporation owns all the public utilities. Blackburn is one of the chief seats of the cotton manufacture, there being upward of 140 mills, as well as works for making cotton machinery and steam-engines. The cottons made in the town and vicinity have an annual value of about \$25,000,000. Pop. about 127,527.

Blackcock, or **Heathcock**, a large European grouse (*Tetrao tetrix*), so called because of the glossy black color of the cock. The female is grayish, mottled in darker colors, and is called "grayhen," or "heathhen." See CAPERCALLIE.

Blackfeet Indians, a tribe of Indians inhabiting the United States and Canada from the Yellowstone to Hudson Bay. They received this name from the fact that the first ones seen by white men wore leggings blackened by traveling over the burnt prairie. They call themselves "plainmen." At the end of the first quarter of the 19th century they numbered nearly 50,000. In 1903, less than 6,000 remained, of whom nearly half were on the reservation in Montana.

Blackfin. See BLUEFIN.

Blackfish, any one of a variety of dark-colored fishes, both of America and Europe. For the American "blackfish," see TAUTOG; SEABASS, and MINNOW. The English "blackfish" is a kind of mackerel (*Centrolophus niger*), about two feet long. It occurs rather abundantly off the south coast of Europe, and is much esteemed as a food fish.

The name is also given to a small "killer" whale of the genus *Globiocephalus*, which goes about in herds that often enter harbors. They are sought by fishermen for the sake of a small amount of oil, resembling sperm-oil, to be obtained from their fat, and also for the sake of their beef-like flesh. The common blackfish of the Atlantic is *G. brachypterus*, and that of the

BLACKGUARD — BLACKMAIL

North Pacific *G. scammoni*. Sailors give the name "blackfish" to the "caaing," or "pilot" whale (q.v.), and to various other small cetaceans. Consult: Bullen, 'Cruise of the Cachalot'; Scammon, 'Marine Mammals of North America.' See also KILLER.

Blackguard, a term used in the 16th century for the lowest menials of a noble house, the scullions who cleaned pots and pans. It was also used of the hangers-on of an army, camp followers, then a rabble, and to vagabonds in general.

Blackhead, the name for several animals, characterized by the blackness of the head; especially in the United States: (1) the scaup duck; (2) a common minnow, the fathead (q.v.). The name is also applied to the accumulations of dirt found in the sebaceous follicles. See ACARUS.

Blackheath, England, an elevated heath in the county of Kent. It borders on Greenwich Park, and is about five miles from St. Paul's, London. It contains 267 acres, and is a place of popular resort, much used for cricket-playing. In 1831 Wat Tyler and John Ball mustered their followers here. Jack Cade occupied the same position twice in 1450. In 1497 the Cornish insurgents, under Lord Audley, were routed there by the king's forces. Blackheath has been the scene of many historical pageants and processions, as it was formerly the custom for the mayor and corporation of the city of London, and even the king and court, to repair thither to meet illustrious foreigners from the Continent. Henry IV. met there (1400) the Byzantine emperor, Michael Palæologus; the corporation of London there met Henry V., on his return from Agincourt, and the year afterward, the Emperor Sigismund. The most splendid, and one of the last of all, was the reception of Anne of Cleves, by Henry VIII., January 1541; she was conducted through Greenwich Park to the palace at Greenwich, followed by prodigious numbers of nobility and gentry, and 1,200 privileged citizens, clad in velvet and chains of gold.

Blackhorse, a fish, one of the suckers of the Mississippi valley (*Cyprinus elongatus*); also known as the Missouri or gourdseed sucker. It is about two feet long, with a small head, suggesting, in profile, that of a horse, and becomes almost jet-black in spring. See SUCKER.

Blackie, John Stuart, Scottish poet, litterateur, and professor: b. Glasgow, 1809; d. 2 March 1895. He was educated at the universities of Aberdeen and Edinburgh; subsequently went to Göttingen, Berlin, and Rome, where he continued his studies, which were chiefly connected with philology. In 1834 he published a translation of Goethe's 'Faust,' and the same year became an advocate at the Scottish bar; in 1841 he accepted the chair of humanity in Marischal College, Aberdeen. This position he held until, in 1852, he was appointed to the professorship of Greek in the University of Edinburgh, a chair which he resigned in 1882. By his unwearied efforts to preserve the Gaelic language, he succeeded in raising \$60,000, with which sum a Celtic chair was endowed in Edinburgh University. Among his more important writings are: 'Lyric Poems'; 'Homer and the

Iliad'; 'Musa Burschicosa'; 'Hæ Hellenicæ'; 'Self-culture'; 'Songs of Religion and Life'; 'Lays of the Highlands and Islands'; 'Lay Sermons'; 'Altavona'; 'Wisdom of Goethe'; 'Life of Burns'; 'Scottish Song'; and 'Song of Heroes.' His biography has been published (2 vols.) by Anna M. Stoddart.

Blacking, the article employed in blacking boots and shoes, usually contains for its principal ingredients oil, vinegar, ivory, or bone black, sugar or molasses, and strong sulphuric acid, though every manufacturer has his own recipe, and endeavors to turn it to best account by concealing its composition and puffing its merits. Blacking is used either liquid or in the form of a paste, but both are obtained from the same ingredients, the only difference being that in making the paste a portion of the liquid is withheld. A celebrated old English blacking consists of 18 ounces of caoutchouc dissolved in 9 pounds of hot rape-oil, 60 pounds ivory-black, 45 pounds molasses, and 20 gallons vinegar, of strength No. 24, in which 1 pound finely ground gum-arabic has been dissolved. The whole mixture, after being carefully triturated in a grinding mill, receives 12 pounds sulphuric acid, in small successive quantities, stirring strongly for half an hour. The stirring is continued for half an hour daily during a fortnight, and then 3 pounds of gum-arabic are added, after which the stirring is resumed, and continued as before for another fortnight. This gives fine liquid blacking; the paste is obtained within a week by withholding 8 of the 20 gallons in which the gum-arabic is dissolved.

Blackleg, a cattle disease. See BLACK QUARTER.

Blackmail, originally a certain rate of money, corn, cattle, or the like, anciently paid, in the north of England and in Scotland, to certain men who were allied to robbers, to be protected by them from pillage. It was carried to such an extent as to become the subject of legislation. Blackmail was levied in the districts bordering the Highlands of Scotland till the middle of the 18th century. In the United States, in common language, and in general acceptance, it is equivalent to, and synonymous with, extortion—the exaction of money, either for the performance of a duty, the prevention of an injury, or the exercise of an influence. It supposes the service to be unlawful and the payment involuntary. Not unfrequently it is extorted by threats, or by operating upon the fears or the credulity or by promises to conceal, or offers to expose, the weaknesses, the follies, or the crimes of the victim. There is moral compulsion, which neither necessity nor fear, nor credulity can resist. The New York statutes upon the subject have been adopted in substance by many other States of the Union. These statutes provide, substantially, that a person who knowing the contents thereof, and with intent, by means thereof, to extort or gain any money or other property, or to do, abet, or procure any illegal or wrongful act, sends, delivers, or in any manner causes to be forwarded or received, or makes and parts with for the purpose that there may be sent or delivered, any letter or writing, threatening to accuse any person of a crime, or to do any injury to any person or to any property, or to publish or connive at publishing any libel, or to expose or impute to any person any deformity or dis-

BLACKMORE—BLACKSNAKE

grace is punishable by imprisonment for a term, usually, not exceeding five years. In New York and in various other States it is also a misdemeanor for any person who, under circumstances not amounting to robbery, or an attempt at robbery, with intent to extort or gain any money or other property, verbally makes such a threat as would be criminal under the statute mentioned above, and it is immaterial whether a threat made as specified in the statute, is of things to be done or omitted by the offender, or by any other person.

Blackmore, Richard Doddridge, English novelist: b. Longworth, Berkshire, 7 June 1825; d. 20 Jan. 1900. His father, curate of Longworth, and a graduate of Exeter College, Oxford, was a man of scholarly character; among his' ancestors on his mother's side Blackmore numbered Philip Doddridge, the Non-Conformist divine. Blackmore was educated at Blundell's School at Tiverton and at his father's college, which he entered in 1843 with a good reputation for scholarship, and where he had a successful career. In one of his long vacations he began 'The Maid of Sker,' which was not published till 1872. He was graduated in 1847, with M.A. in 1852. In 1852 he married Miss Lucy Maguire, and while supporting himself in London read law in the Inner Temple. Admitted to the bar the same year, he had some success as a conveyancer, but finding London life detrimental to his health, gave up his work and in 1855 became classical master at Wellesley House School, Twickenham Common. In 1853 he published his first volume, 'Poems by Melanter,' and a little later 'Epullia,' also an anonymous volume of verses. In 1855 appeared 'The Bugle of the Black Sea,' and in 1860 'The Fate of Franklin.' About this time a legacy from his uncle, the Rev. H. H. Knight, enabled him to build himself a substantial country house, Gomer House, at Teddington, near Twickenham. Here he lived the rest of his life, devoting his mornings to the raising of fruits and flowers, famous for quality but costing him an average loss of £250 a year. The remainder of his time he gave over to literature. A translation of two of the Georgics of Virgil, entitled 'The Farm and Fruit of Old' (1862), was followed by 'Clara Vaughan' (1864) and 'Cradock Nowell' (1866), neither very successful novels. His third novel, 'Lorna Doone' (1869), after a somewhat slow start, became one of the great popular novels of the century; up to the time of Blackmore's death it had gone through nearly 50 editions, and has now assumed the place of a semi-classic. Uneven in structure, often prolix, exaggeratedly romantic, occasionally falling into a false metrical prose, it nevertheless continues to hold the interest of its readers through the fine sense of the Devon country where the scene is laid, the very real and human country types, and the essentially manly character of its hero, John Ridd. Up to the time of his death, Blackmore continued to produce novels at the rate of about two in five years. Of these the most important are 'The Maid of Sker,' regarded by the author as his best, 'Springhaven' (1887) which he thought superior to 'Lorna Doone,' 'Alice Lorraine' (1875), and 'Cripps the Carrier' (1876). The other titles are: 'Erema, or My Father's Sin' (1877), 'Mary Annerley' (1880), 'Christo-

well' (1882), 'The Remarkable History of Tommy Upmore' (1884), 'Kit and Kitty' (1889), 'Perleycross' (1894), 'Tales from the Telling House' (1896), and 'Dariel' (1897). A volume of verse, 'Fringilla' (1895), completes the list of his published work. No life has as yet been published, and most of the commentary on him is to be found in magazine articles and reviews.

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Blackpool, England, a town and county borough on the west coast, and in the Blackpool Division of North Lancashire, between the estuaries of the Ribble and Wyre, 27 miles south-west of Lancaster, which has of late years attracted many visitors by its advantages as a watering place. It affords excellent accommodation for visitors in the numerous hotels, hydro-pathic establishments, and lodging-houses, and consists of ranges of lofty houses about three miles long facing the sea, in front of which extends an excellent promenade and carriage drive. The town is abundantly supplied with the means of amusement and recreation, including theatres, concert rooms, fine winter gardens, aquarium, extensive pleasure-grounds, park of 60 acres, a great steel tower over 500 feet high, a gigantic wheel, and other attractions. There are a court-house and three markets, several churches, six council schools, eight non-provided schools and one for higher education, libraries and news-rooms. Blackpool was incorporated as a municipal borough on 21 Jan. 1876, and as a county borough 1 Oct. 1904.

Blacksnake, or **Blue Racer**, a common colubrine serpent (*Zamenis constrictor*) found throughout the United States, and the adjacent parts of Canada. The typical eastern black-snake is uniform lustrous black above, and slate-color beneath, the lower jaw, chin, and sometimes upper edges of the lip-plates white, the tongue black. Western specimens are bright olive-green, with the entire under surface greenish-white, varying to bright yellow, which accounts for the name, "blue" or "green racer," often heard in the Mississippi valley. The young, under 18 inches in length, are variegated with dark blotches upon olive, and light margins to the scales, especially on the sides. The female is larger than the male, but rarely if ever exceeds six feet in length. This is one of the most numerous and vigorous of American snakes, making its home in hollow stumps and underground dens. At the approach of winter, many are likely to gather together in similar retreats, and remain there in a torpid condition until spring, entangled into a ball, for the sake of mutual warmth. Its motions are of the swiftest, it being capable of running with great rapidity and of scaling trees, sometimes to a height of 100 feet above the ground, where it searches from branch to branch for birds' eggs, young squirrels, etc. It seeks much of its food in swamps and along streams, mainly frogs, toads, eggs and young of birds, insects, and other snakes. Cope says: "The constricting power of blacksnakes is not sufficient to cause inconvenience to a man, but might seriously oppress a child. . . . It is easy to unwind the snake with the free hand and arm." The black-snake is harmless, and its bite is no worse than

BLACKSTOCK HILL—BLACKSTONE RIVER

that of a mouse. It is readily tamed, and shows some intelligence. It is courageous and will sometimes attack an enemy, moving forward with the head raised a foot or two above the ground, and waving about with a most terrifying aspect. Its principal enemies are the badger and skunk, and it seems to hold a special animosity toward the copperhead and rattlesnakes, whose trail it follows, at night, by its power of scent; and having overtaken the object of its pursuit, it leaps upon it, avoiding its stroke by its swiftness, wraps itself about it, and slowly crushes its victim to death, after which it swallows it whole. The blacksnake breeds during the summer, the female laying 15 or 20 eggs at a time in the hollow of a sunny bank, or in the midst of a decayed stump, around which she stays, guarding her young until they reach a considerable age.

Several other species of the genus belong to the southwestern United States, Mexico, and the West Indies, and the Texan whipsnake (q.v.) is a near relative. The "chainsnake" is sometimes called "mountain blacksnake." Other blackish serpents known as blacksnakes include a colubrine of Jamaica (*Ocyophis ater*); the death adders (q.v.) of Australia and Tasmania, and some others notable for dark hues. One of the most widespread of the native names of the East Indian Cobra de Capello has the meaning "blacksnake." Consult: Cope, 'Snakes of North America.'

Blackstock Hill, South Carolina, a locality where, on 20 Nov. 1780, the patriots of the State, under Gen. Sumter defeated Tarleton's cavalry after a sharp encounter.

Blackstone, William, the first inhabitant of Boston, was an Episcopal minister, who settled there as early as 1625 or 1626, and died 26 May 1675, on Blackstone River, a few miles north of Providence. On the arrival of Gov. Winthrop at Charlestown, in the summer of 1630, it is stated in the records of that place that "Mr. Blackstone, dwelling on the other side of Charles River, alone, at a place by the Indians called Shawmut, where he only had a cottage, at or not far off from the place, called Blackstone's Point, he came and acquainted the governor of an excellent spring there, withal inviting him and soliciting him thither; whereupon, after the death of Mr. Johnson and divers others, the governor, with Mr. Wilson, and the greatest part of the Church, removed thither." At a court held in April 1633, 50 acres of land near his house in Boston were granted to him forever. In 1634 he sold his land and became the first white settler within the present limits of Rhode Island.

Blackstone, Sir William, English lawyer, and the most popular writer on the laws and constitution of his country: b. London, 10 July 1723; d. 14 Feb. 1780. He was educated on the foundation of the Charter House, whence in 1738 he was removed to Pembroke College, Oxford. He was much distinguished, both at school and at the university, and at an early age compiled a work for his own use, entitled the 'Elements of Architecture,' which has been much praised. Having chosen the profession of the law, he was in due time entered at the Middle Temple, and on this occasion published the admired verses called the 'Lawyer's Farewell to His Muse,' which appeared in 'Dodsley's Mis-

cellany.' In 1743 he was elected Fellow of All-Souls College, Oxford, and in 1746 was called to the bar, and commenced the practice of law. Being deficient in elocution, and not possessed of the popular talents of an advocate, his progress was slow. Having attended the courts of law at Westminster for seven years, without success, he determined to quit the practice of his profession, and retire to his fellowship at Oxford. The system of education in the English universities supplying no provision for teaching the laws and constitution of the country, Blackstone undertook to remedy this defect by a course of lectures on that important subject; and the manner in which he executed the task has conferred a lasting distinction on Oxford. His first course was delivered in 1753, and was repeated for a series of years with increasing effect and reputation. These lectures doubtless suggested to Mr. Viner the idea of founding, by his will, a liberal establishment in the University of Oxford for the study of the common law; and Blackstone was, with great propriety, chosen the first Vinerian professor. His engagements at Oxford did not prevent his occasional practice as a provincial barrister; and in 1754, being engaged as counsel in a contested election for the county of Oxford, he was led into considerations on the elective franchise, which produced his work entitled 'Considerations on Copyholds.' In 1759 he published a new edition of the Great Charter and Charter of the Forest, with an historical preface; and during the same year, the reputation which he had obtained by his lectures induced him to resume his attendance at Westminster Hall, when business and the honors of his profession soon crowded in upon him. In 1761 he was elected member of Parliament for Hindon, made king's counsel and solicitor-general to the queen. About this time he also married, and thereby losing his fellowship, was appointed principal of New Inn Hall; which office, with the Vinerian professorship, he resigned the next year. In 1765 he also published the first volume of his 'Commentaries on the Laws of England'; a work of greater merit than any which had yet appeared on the subject. The real merit and talents of Blackstone, backed by political tendencies which are generally favorable to advancement, now made him an object of ministerial favor, and he was offered the post of solicitor-general in 1770, and, declining it, was made one of the justices of common pleas, which station he held until his death, in his 57th year.

Blackstone, Mass., town in Worcester Co., on the Blackstone River, and on the New York, New Haven and Hartford R.R. It is an important manufacturing town and the centre of an extensive agricultural region. It has numerous churches, schools, library, weekly newspapers, electric lights, and excellent water-power. Pop. (1890) 6,138; (1910) 5,648.

Blackstone River, a river of eastern New England; rises in Paxton and Holden townships, Worcester County, Mass., flows southeast into the State of Rhode Island, and empties into the Providence River, near Providence, where it is known as the Seekonk. It is over 50 miles long, and falls over 700 feet, thus affording abundant water-power, and for a great part of its course flows through an almost continuous village of manufacturing establishments.

BLACKTAIL — BLACKWELL

Blacktail, the name of two different species of western American deer, notable for the blackness of the tail as compared with the snowy white tail of the eastern or "white-tailed" deer. One of them is more suitably called "mule" deer, and is described elsewhere under that title. The other is the Columbian or Pacific Coast deer (*Cervus*, or *Odocoileus columbianus*).

The Columbian blacktail is somewhat smaller than the mule deer, with relatively shorter ears and finer hair. The general color in summer is red or reddish-yellow; in winter the color is more varied. The coat is then brownish-gray, darkest along the spine; top of head, chestnut and black; face gray, with a black spot on the forehead, passing backward as a stripe over each eye; chin white, behind which is a black patch; upper throat, posterior portion of under part, and base of tail, white; chest, sooty; legs, dark cinnamon, white inside, and rest of under parts covered with black; upper surface of the tail, black. The antlers of the buck resemble those of the mule deer. This deer is limited to the Pacific coast, from central California northward to Alaska, and does not pass east of the coast ranges of mountains. It is a deer of the woods, frequenting the foot-hills and valleys especially those covered with small brush; and its habits and gait, more nearly resemble those of the white-tailed deer, than of the mountain-loving mule deer. Its hunting affords excellent sport, and its venison is highly prized. See also **DEER**. Consult: Farrell, 'Big Game in North America', and VanDyke, 'The Deer Family.'

Blackthorn, a shrub or small tree. See **SLOE**.

Blackwater Fever, an obscure disease of uncertain causation that is prevalent in Africa, and is said to be present in other parts of the world. By many it is regarded as a very severe form of malaria, a malignant form, associated with great prostration and with bloody urine. By others it is considered a disease of itself and due to a special parasite of the blood. The question will undoubtedly be settled within a short time as soon as skilled physicians have the opportunity of studying the disease in Africa.

Blackwell, Mrs. Antoinet Louisa (BROWN), American woman suffragist and Unitarian minister: b. Henrietta, N. Y., 20 May 1825. A graduate of Oberlin (1847), she "preached on her own orders," at first in Congregational churches, becoming at length a champion of women's rights. She married Samuel C., a brother of Dr. Elizabeth Blackwell (1856). She has written 'Shadows of Our Social System' (1855); 'The Island Neighbors' (1871), a novel of American life; 'Sexes Throughout Nature' (1875), etc.

Blackwell, Elizabeth, the first woman who ever received the degree of M.D. in the United States: b. Bristol, England, 3 Feb. 1821. Elizabeth, a girl of 17 years at the time of her father's death, and one of the elder of nine children, opened a school, which she conducted successfully for several years. But her energetic temperament and strong desire for the acquisition of knowledge demanded a wider field; and long reflection having persuaded her that some avenue should be opened to women whom either necessity or choice impelled to gain a subsistence by their own exertions, she felt that

her path of duty lay in that direction. She resolved to become a physician, and to return again to teaching to acquire the requisite means of education. A situation as governess was found in the family of Dr. John Dixon, of Asheville, N. C., where she remained a year, having access, during that time, to a medical library, and receiving from Dr. Dixon some direction as to her reading, but no encouragement in her purpose. At the end of the year she removed to Charleston, S. C., still acting as a teacher of music, but pursuing her studies with the aid and sympathy of Dr. S. H. Dixon, subsequently professor of the institute and practice of medicine in the University of New York. Miss Blackwell next went to Philadelphia, and passed six months in study under Dr. Allen and Dr. Warrington, of that city. During that time she made formal application to the medical schools of Philadelphia, New York, and Boston, for admission as a student. In each instance the request was courteously but firmly denied, on the ground of a want of precedent for such an admission, and of the impropriety of such an innovation upon established custom. Several of the professors, however, avowed a sincere interest in her hopes and purposes, and some of them urged her to seek admission into one or another of the schools under the disguise of a feigned name and male attire. She declined to take into consideration any such suggestion, for, though anxious to obtain a medical education for herself, she was hardly less desirous of asserting her right to it as a woman. Undismayed by these difficulties, however, she next made application to 10 other medical schools in different parts of the country, which was rejected by all except those at Geneva, N. Y., and at Castleton, Vt. At Geneva, the faculty, after expressing their own acquiescence, laid the proposition before their students, leaving the decision with them. The young men unanimously assented to the reception of the new pupil, and pledged themselves that no conduct of theirs should ever cause her to regret the step she had taken. It is to their credit that they faithfully observed this pledge during the two subsequent collegiate years that she passed among them. Here Miss Blackwell took her degree of M.D., in regular course, in January 1849. During her connection with the college, but when not in attendance there upon lectures, she pursued a course of clinical study in Blockley Hospital, in Philadelphia. The spring after her graduation she went to Paris and remained six months as a student in the Maternité, devoting herself to the study and practice of midwifery. The next autumn she was admitted, as a physician, to walk the hospital of St. Bartholomew, in London, where she could not have been received as a student. After nearly a year spent in St. Bartholomew's she returned to New York, where she practised her profession with credit and success, and established the New York Infirmary for Women and Children, and the Woman's Medical College. In 1859 she registered as a physician in England, and since 1869 has practised in London and Hastings; she founded the National Health Society in London, and assisted in founding the London School of Medicine for Women. Her works include: 'Physical Education of Girls'; 'Religion of Health'; 'Counsel to Parents on Moral Education'; 'Pioneer in Opening

BLACKWELL — BLADDER

the Medical Profession to Women'; 'The Human Element in Sex'; 'Decay of Municipal Representative Institutions.'

Blackwell, Lucy Stone. See **STONE, LUCY B.**

Blackwell, Thomas, Scottish writer: b. Aberdeen, 4 Aug. 1701; d. Edinburgh, 1757. After receiving the rudiments of his education at the grammar-school of his native city, he entered Marischal College, where he took the degree of A.M. in 1718. A separate professorship of Greek had not existed in this seminary previous to 1700. Blackwell, having turned his attention to Greek, was honored in 1723, when only 22 years of age, with a Crown appointment to this chair. His 'Inquiry into the Life and Writings of Homer' was published at London in 1737. A second edition of the work appeared in 1746, and shortly after 'Proofs of the Inquiry into Homer's Life and Writings.' In 1748 he published anonymously 'Letters Concerning Mythology.' In the course of the same year he was advanced to be principal of his college. In 1750 he opened a class for the instruction of the students in ancient history, geography, and chronology. In 1752 he obtained the degree of LL.D., and in the subsequent year published, in quarto, the first volume of 'Memoirs of the Court of Augustus.' A second volume appeared in 1755, and a third, which was posthumous, and left unfinished by the author, was prepared for the press by John Mills, Esq., and published in 1764.

Blackwell's Island, N. Y., an island in the East River belonging to New York city. It has an area of about 120 acres, and contains the penitentiary, almshouse, lunatic asylum for females, workhouse, blind asylum, hospital for incurables, and a convalescent hospital. Nearly all of these buildings were erected from granite quarried on the island, by convict labor, the style of architecture being of a turreted and battlemented design of the feudal character. The island is bordered by a heavy granite sea wall, also built by the convicts, and a large amount of farming and gardening is carried on by inmates of the penitentiary.

Blackwood, Adam, Scottish writer: b. Dunfermline, 1539; d. 1613. Scotland, during his youth, was undergoing the agonies of the Reformation. He therefore found it no proper sphere for his education, and went to Paris, where, by the liberality of his youthful sovereign, Queen Mary, then residing at the Court of France, he was enabled to complete his studies, and to go through a course of civil law at the University of Toulouse. Having now acquired some reputation for learning and talent, he was patronized by James Beaton, the expatriated Archbishop of Glasgow, who recommended him very warmly to Queen Mary and her husband the dauphin, by whose influence he was chosen a member of the Parliament of Poitiers, and afterward appointed to be professor of civil law at that court. His first work was one entitled 'De Vinculo Religionis et Imperii, Libri Duo' (Paris 1575), to which a third book was added in 1612. His next work was entitled 'Apologia pro Regibus,' and professed to be an answer to George Buchanan's work, 'De Jure Regni apud Scotos.' He next published, in French, an account of the death of his benefactress, Queen Mary, under the title, 'Martyre de Maria Stuart Reyne d'Escosse' (Antwerp, 8vo. 1588).

At the end of the volume is a collection of poems in Latin, French, and Italian, upon Mary and Elizabeth; in which the former princess is praised for every excellence, while her murderess is characterized by every epithet expressive of indignation and hate. In 1644, 30 years after his death, appeared his 'Opera Omnia,' in one volume, edited by the learned Naudeus, who prefixes an elaborate eulogium upon the author.

Blackwood, William, Scottish bookseller, known as the projector and publisher of 'Blackwood's Magazine': b. Edinburgh, 20 Nov. 1776; d. 16 Sept. 1834. He settled in his native city as a bookseller in 1804, and soon added the trade of a publisher to his original business. The first number of 'Blackwood's Magazine' appeared on 1 April 1817, and from the first was conducted in the Tory interest. It was started just at the time when the general peace which had been established in Europe was beginning to reanimate the hopes of the Whigs, and when it was all the more necessary for the Tories to defend by the press that preponderance which they still held in Parliament. Mr. Blackwood was fortunate enough to secure as his coadjutors in his new literary undertaking most of the leading authors of the day belonging to the Tory party, among them Sir Walter Scott, John Gibson Lockhart, Hogg (the Ettrick Shepherd), Prof. Wilson (Christopher North), De Quincey (the English Opium-eater), and others. All that was connected with the management of the magazine he took into his own hands, and he himself selected the articles for each number — a task for which he was admirably qualified, for although he wrote little himself, he was an admirable judge of literary works. The new magazine on its first appearance entered upon a campaign against the Edinburgh 'Review,' combating both its political views and its literary decisions. From the first it attracted a great deal of attention, and its success was decided by the appearance of the 'Noctes Ambrosianæ,' a series of articles in the form of dialogues, in which the current questions in politics and literature were discussed with the most pungent sarcasm and inexhaustible humor. The brilliant articles of Dr. Maginn added not a little to its reputation, and constantly, as the original contributors withdrew, new and valuable accessions were made to the staff of its supporters. After his death his business continued to be carried on by his sons, and the magazine, although it has perhaps lost some of its former reputation (or notoriety), still keeps its place as one of the leading periodicals.

Blackwood. See **DALBERGIA.**

Blackwood's Magazine. See **BLACKWOOD, WILLIAM.**

Bladder, the muscular organ that in man and the lower animals holds the urine. The kidneys secrete urine constantly, the bladder stores it and only empties itself at more or less definite intervals. In man the bladder is a flattened rounded to conical organ about the size of an orange, and holding under normal conditions about 16 ounces of urine (one pint). It is situated in the lower portion of the abdominal cavity just behind the pubic bone, which serves as a protection. Its general shape is rounded triangular, the flat side being above, the ureters leading from the kidneys entering at the corners; the pointed end corresponding to the

BLADDER-NUT — BLADDERWORM

opening into the urethra, through which canal the urine is voided. The walls of the bladder are made up of several layers; the outer wall is of peritoneum in part, or serous and connective tissue combined. The greater part of the wall is made up of involuntary muscle fibre, arranged longitudinally and circularly; the innermost coat is thin and delicate,—the mucous membrane,—and is lined throughout by layers of regularly flattened squamous epithelial cells. The nervous supply of the bladder, by means of which it is emptied, is complex and probably threefold. It is under the influence of the sympathetic nervous system of the hypogastric plexus; there are subsidiary centres in the spinal cord and higher up in the human cortex certain voluntary efforts have their influence on the bladder control. The primary centres of control are in the sympathetic. These cause the bladder in the young infant and also in the patient whose spinal cord and centres are diseased to be emptied and in the so-called irritable bladder it is probable that this part of the mechanism is mostly affected.

There is a very marked relation between the skin activities and the kidney and bladder action, for while the skin is acting freely as in exercise in warm weather, a large amount of water is thus given off, which in cold weather is eliminated through the kidneys and thus by the bladder. This is noted daily when in cold weather one leaves the warm house and shortly after walking in the cold of the outside air, the desire to urinate becomes urgent. Irritability of the bladder, particularly in children, and bedwetting is often a very troublesome complaint. It may be due to a variety of causes, excessive irritation, however, would probably not result in bedwetting, particularly in older children, if the control (inhibition) normally maintained by the brain were not cut off by deep slumber. The treatment is always medical and is often very difficult. Infection of the bladder frequently occurs and leads to many serious complications. (See CYSTITIS.) Stones also develop in the bladder. (See CALCULUS.)

Paralysis of the bladder *per se* is a rare affection; paralysis of the sphincter that controls the outlet may result from a variety of causes. It usually results in incontinence of urine. Retention is an opposite condition and is frequently due to loss of sympathetic nerve action, such as follow labor, or an operation, or from the anæsthesia of opium, belladonna, or similar narcotics. It may also be due to mechanical obstruction, in old men, particularly being due to an hypertrophied prostate gland.

Bladder-nut (*Staphylea*), the type genus of the order *Sapindaceæ*, consisting of eight species of ornamental shrubs or small trees, natives of the northern hemisphere. The common bladder-nut (*S. pinnata*) a native of Europe and Asia, which attains a height of 15 feet, and is often planted for ornament, bears panicles of whitish flowers in late spring. The American bladder-nut (*S. trifolia*), which ranges from Quebec to Minnesota and southward to South Carolina and Missouri, bears nodding panicles or umbel-like racemes of white flowers and, like several of the other species, is used in shrubberies. The wood of the two species mentioned is white and hard and is used in turning. The flower buds are pickled like capers and the seeds sometimes eaten. The common name is suggested by the inflated capsule and the hard shell

of the seed; the generic name by the resemblance of the raceme to a bunch of grapes, the staphyle of the Greek language.

Bladderworm, *Cysticercus* or immature stage of the tapeworm, the hydatid of physicians. By far the most injurious species is *Tænia echinococcus*, more frequently causing death than any other entozoon. In its adult or strobila state this worm only infests the dog and wolf, but its larva, the hydatid of physicians, frequently occurs in the human body. It is very small, seldom exceeding six millimetres in length, there being but four segments, including the head, which has a pointed rostellum, with a double crown of large-rooted hooks; there are four suckers present, and the last segment, when sexually mature, is as long as the anterior ones taken together. The hydatid (*Proscotex*) forms large proliferous vesicles, in which the scolices (*echinococcus* heads) are developed by budding internally. About 5,000 eggs are developed in a single segment (*Proglottis*). The six-hooked embryos develop, are expelled from the dog, and find their way in drinking water or in food into the human intestines, whence they bore into the liver, their favorite habitat, or are carried along the blood vessels into some other organ, where they develop into bladder-like bodies, called hydatids. In its earliest stages the hydatid is spherical and surrounded by a capsule of condensed connective tissue of its host. By the fourth week the young *F. echinococcus* is one-fiftieth of an inch long, and it is probably many months before the echinococci heads are entirely developed. When this stage is reached the tapeworms become sexually mature in from seven to nine weeks after, when the milk-white worms may usually be found imbedded in the mucus of the duodenum and upper part of the small intestines, with their heads attached to the villous surface of the intestine. The hydatids or cysts in which the echinococci develop are of three kinds,—exogenous, endogenous, and multilocular,—and lie imbedded in the parenchyma of the liver, etc., and are filled with a clear amber-colored fluid. The echinococcus heads, first on the inner surface of the cyst and in the interior of the echinococcus head (brood-capsule), develops a second brood of scolices, contained in a secondary cyst. Finally, a tertiary cyst, containing tertiary or granddaughter scolices, arises. In such cases the number of tapeworms which arise from one embryo is naturally enormous, and the parent vesicle may reach a very considerable size, being sometimes as large as a man's head. In consequence of this enormous growth the vesicles frequently obtain an irregular shape; while on the other hand the tapeworms which develop from them remain very small, and carry, as a rule, only one ripe proglottis. Sometimes the secondary hydatids will develop scolices and granddaughter vesicles before the original maternal hydatid has acquired echinococcus heads.

So long as the tapeworm head (*scolex*) remains attached to the body of the bladder-worm and in the host of the latter, it never develops into a sexually mature tapeworm; although in many cases it grows to a considerable length (*Cysticercus fasciolaris* of the house-mouse). The bladderworm must enter the alimentary canal of another animal before the head can, after separation from the body of the bladderworm, develop into the sexually mature tapeworm. This

BLADDERWORT — BLAINE

transportation is effected passively, the new host eating the flesh or organs of the animal infected with *Cysticerci*. The tapeworms, therefore, are principally found in the *Carnivora*, the *Insectivora*, and the *Omnivora*, which receive the bladderworms in the flesh of the animals on which they feed. The vesicles are digested in the stomach, and the cestode head becomes free as a scolex. The latter is, perhaps, protected from the too intense action of the gastric juice by its calcareous concretions, and at once enters the small intestine, fastens itself to the intestinal wall, and grows by gradual segmentation into a tapeworm. From the scolex the chain of proglottides proceeds as the result of a growth in length accompanied by segmentation, a process which is to be looked upon as a form of asexual reproduction (budding in the direction of the long axis). The development of the scolex is then to be explained as a metamorphosis, characterized by the individualization of certain stages of the development. But the whole life-history is a case of metagenesis, inasmuch as the sexual proglottides alternate with the asexual scolex. See TAPEWORM.

Bladderwort, *Utricularia*, a genus of about 150 species of largely aquatic herbs of the natural order *Lentibulariaceae*, widely distributed throughout the world, but especially abundant in the tropics. The aquatic species are remarkable for the little, sometimes valved, bladders which entrap and digest aquatic insects and other water animals. The bladders which are at first filled with water become inflated with air at flowering time so that the flower instead of being submerged like the rest of the plant, is raised above the surface until after blossoming, when water again fills the bladders, the plants sinking to the bottom, where the seeds are ripened. These aquatic species, of which about a dozen with yellow or blue flowers are natives of the United States, are common in ditches, ponds, and marshes throughout the world. They are sometimes cultivated in aquaria more as curiosities than for any intrinsic beauty. In the marsh species the bladders are less effective and numerous than in the pond species, and in the terrestrial kinds they are small, abortive, and useless. These last have leaves of ordinary forms and are often tuberous, whereas members of the first group have much dissected foliage like other pond plants and are rootless. Some of the tropical species are showy epiphytes and are cultivated in hot-houses like orchids, with some of which they compare in beauty. Consult: Bailey, 'Cyclopedia of American Horticulture' (1900-2).

Bladensburg, Maryland, a small town in Prince George County, on the east branch of the Potomac, about six miles east from Washington, with a population in 1910 of 500. At the bridge over the Potomac west of Bladensburg, the battle with the English which preceded the capture of Washington, took place toward the latter part of the War of 1812, Gen. Ross and Admiral Cockburn with about 5,000 men, appeared in Chesapeake Bay to attack Washington. The American forces fell back to Bladensburg and awaited the British. The Americans numbered about 7,000, but were scattered and untrained. On 24 Aug. 1814, the British advanced to the attack. The American artillery held them in check for a time, but the troops pushed forward.

The Americans fled in wild disorder; the confusion spread and soon Gen. Winder, the American commander, gave orders for a general retreat. The American loss was 76 men; the British more than 500 killed and wounded. Bladensburg is famous in American history as the site of the duelling ground, where many famous duels growing out of quarrels in Washington were fought, as that in which Barron killed Decatur in 1820.

Blagoveshtchensk, blā - gö - vyësh'chënsk, Russia, a town of eastern Siberia, capital of the province of the Amoor, and of the general government of the Amoor, on the river Amoor, where it receives the Zeya, near the Chinese town of Aigoon. Founded as a military post in 1856 it is now an important place, with secondary schools, theological seminary, etc. Pop. about 40,000.

Blaikie, William, American athlete and writer on physical training: b. York, N. Y., 1843; d. there 6 Dec. 1904. He became a lawyer in New York. He has written 'How to Get Strong' (2d ed. 1880); 'Sound Bodies for our Boys and Girls' (1883).

Blaikie, William Garden, Scotch clergyman: b. Aberdeen, 1837; d. 11 June 1899. He was graduated at the University of Aberdeen; ordained a minister of the Established Church in 1842; joined the Free Church in 1843; and was appointed professor of apologetics and pastoral theology in New College, Edinburgh, 1868. He was a delegate to the Presbyterian General Assembly of the United States in 1870; took a leading part in the formation of the Alliance of the Reformed Churches; and was editor of the 'Free Church Magazine' in 1849-53; the 'North British Review' in 1860-3; the 'Sunday Magazine' in 1871-4; and the 'Catholic Presbyterian' in 1879-83. His writings include 'Bible History in Connection with General History' (1859); 'Bible Geography' (1860); 'Glimpses of the Inner Life of David Livingstone' (1880); 'Public Ministry and Pastoral Methods of Our Lord' (1883); 'Leaders in Modern Philanthropy' (1884), etc.

Blaine, Ephraim, American soldier: d. Carlisle, Pa., 1808. He entered the army as a colonel, at the commencement of the Revolutionary War, and was subsequently made commissary-general. His services were gallant and patriotic. He was with Washington in many of the most trying scenes of the Revolution, and enjoyed the confidence of his chief to the fullest extent. During the "dark winter" at Valley Forge, the preservation of the American army from starvation was in a great degree owing to the exertions and sacrifices of Col. Blaine.

Blaine, James Gillespie, American statesman: b. West Brownsville, Pa., south of Pittsburgh, 31 Jan. 1830; d. 27 Jan. 1893. His father, a cultivated landowner, was a Presbyterian of Scotch-Irish blood; his mother was a Catholic. He was a precocious boy with a strong taste for history and literature, and the star of his debating club as orator and parliamentarian. At 13 he entered Washington College in his native county, graduated at 17, and after teaching and studying law, removed to Augusta, Me., in 1854. He entered journalism and politics, joined the new Republican party the next year, was a delegate to its first (Fremont) convention in 1856, and in 1858 became chairman of the State

BLAINVILLE

Republican committee—an extraordinary position at 28 after but four years' residence. He remained such for 20 years, the almost omnipotent dictator of the party's State action. In 1858, also, he was elected to the legislature, and re-elected three more terms, being speaker the last two; and in 1862 was sent to Congress, and re-elected six additional terms to the House. In the House he was the most effective and dexterous of debaters, an adept at parliamentary law, of instant readiness and endless resource; and outside he became early the most captivating, magnetic, and brilliant of party leaders. With a prodigious and instant memory both for facts and faces, saturated with political history and the records of all prominent public men, with great charm of utterance and exuberant geniality of manner, he excited in the mass of his party the most enthusiastic devotion; but unfortunately in the "independent" wing an equally invincible distrust, which ultimately defeated his most cherished ambition. As congressman, his most noted positions were opposing Thaddeus Stevens' reconstruction plans for putting the South under military government, and of cutting down the representation of the States when readmitted to a basis of legal voters; opposing the payment of the public debt in greenbacks; and supporting the agitation which led to Great Britain's admitting her citizens' right to change their allegiance (1870). From 1869 to 1874 he was speaker, and gained the highest reputation for parliamentary ability, firmness, impartiality, and dispatch of business. The tremendous reaction of 1874 against Grant's second term swept the Democrats into control of the House by an immense majority, and Mr. Blaine became the leader of the Republican minority. An envenomed struggle at once began. As a matter of party tactics, and to pave the way for the election of 1876, Mr. Blaine sought to inflame Republican feeling by dwelling on the harshest memories of the war; the Democrats retorted by a series of attacks on his personal integrity in the speakership, as evidence of which they cited letters to a Boston broker which had been kept by a clerk named Mulligan. (See MULLIGAN LETTERS.) He exhibited and read the letters on the floor of the House to prove that they contained nothing discreditable; but the charges, in the hands of his enemies, remained one of the influences which twice lost him the nomination and at last the election to the presidency. In 1876 he received 285 votes, much the largest single vote, on the first ballot at the Republican convention, and 351 on the seventh; his imminent success then produced a coalition on Gen. Hayes. Senator Morrill of Maine becoming secretary of the treasury, Mr. Blaine was chosen senator for the unexpired term, and the following winter for the full term. He opposed the electoral commission on the ground that Congress was conferring powers beyond its own; opposed Hayes' withdrawal of the troops that upheld the carpet-bag governments; opposed the Bland Silver Bill and the adoption of the gold standard alike, believing bimetalism feasible and preferable; advocated ship subsidies, and rigid prohibition of Chinese immigration. In 1880 the attempt at a third term for Grant was defeated by the Blaine forces, who gave him 284 on first ballot; but after six days and 35 ballots, seeing that Blaine could not be nominated, united with the Sherman party to nominate Garfield,

by 399 to Grant's 306. Garfield made him secretary of state, and in his short tenure he planned a Pan-American Congress, attempted mediation between victorious Chile and crushed Peru, and attempted to cancel the Clayton-Bulwer Treaty (q.v.). But the speedy assassination of Garfield, and the accession of Arthur, the lieutenant of Blaine's mortal enemy, Roscoe Conkling, made his place untenable, and on 19 December he resigned. He at once began his two-volume 'Twenty Years in Congress,' a work of great charm and value; issuing the first volume in 1884, in time to do good work conciliating support for the next election. But meantime a memorable political letter to a New York State friend, widely published, was taken as a cue to his adherents in that State to vote against the administration candidate; and caused such a heavy fall in the Republican vote for governor that S. J. Folger, secretary of the treasury, was overwhelmed, and Grover Cleveland, the mayor of Buffalo, in high repute for having crushed a ring of plunderers there, was elected by 192,000 plurality. This unprecedented victory in the largest State of the Union gave Mr. Cleveland the Democratic nomination for President in 1884; and when Mr. Blaine was at last nominated by the Republicans (541 out of 813 on fourth ballot), the Independents carried out the threat of many years by bolting the nomination and mostly voting for Cleveland, who carried New York by 1,047 and with it the electoral majority. After his defeat he issued the second volume of his work (1886), and the next year a volume entitled 'Political Discussions.' Again a candidate in 1888, he withdrew in favor of Harrison, and was made secretary of state once more; he resumed his Pan-American policy, made a futile attempt to induce Great Britain to join in preserving the seals from extermination (see BERING SEA QUESTION), and favored a reciprocity commercial policy which made many of his old opponents draw toward him. He resigned in June 1892, in hope of securing the next Republican nomination, but found it out of the question. He died early the following year, of Bright's disease. His life was written by his kinswoman, Gail Hamilton (1895).

Blainville, Henri Marie Ducrotay de, ön-rê mã-rê dü-krô-tâ dè, French naturalist: b. Arques, near Dieppe, 1778; d. 1 May 1850. He studied medicine and the allied sciences at Paris, and obtained his degree of M.D. in 1808. He was for a time assistant to Cuvier, whose influence helped to place him in the chair of anatomy and zoology in the Faculty of Sciences at Paris in 1812. Unfortunately misunderstandings soon arose between the master and his comparatively youthful rival, and ultimately terminated in an open rupture. In 1825 Blainville was admitted to the Academy of Sciences as the successor of Lacépède, and on the death of Lamarck in 1829, the chair which he held in the Museum of Natural History having been divided, the department of mollusca, zoophytes, and worms was committed to Blainville, whose important works on these groups made it impossible to confer it on any other. In 1832 he quitted this department to become the not unworthy successor of Cuvier in the chair of comparative anatomy in the same establishment. His works, contained both in the more important collections of the period, and in separate treatises, are too numerous to be enumerated,

BLAIR

but mention is especially due to 'L'Organisation des Animaux, ou Principes d'Anatomie Comparée' (1822); 'Manuel de Malacologie et de Conchyliologie avec Atlas de 100 Planches' (1825); 'Cours de Physiologie Générale' (1829-32); 'Manuel d'Actinologie' (1834); 'Sur les Principes de la Zooclassie' (1847); and above all, the gigantic but unhappily unfinished work entitled 'Ostéographie ou Description Iconographique Comparée du Squelette et du Système Dentaire des Cinq Classes d'Animaux Vertébrés, Récents et Fossiles' (1839-50).

Blair, Andrew Alexander, American chemist: b. Kentucky, 20 Sept. 1848. He graduated at the United States Naval Academy, 1866; was chief chemist to the United States Commission to test iron, steel, and other metals, 1875-8, and to the United States Geological Survey and 10th census, 1879-81. Since then he has been engaged in general practice. Besides reports to the government and contributions to scientific journals he has published 'The Chemical Analysis of Iron: Complete Account of all the Best-Known Methods for the Analysis of Iron, Steel, etc.' (Phila. 1888).

Blair, Austin, American lawyer: b. Caroline, N. Y., 8 Feb. 1818; d. Jackson, Mich., 6 Aug. 1894. He graduated at Union College in 1839; studied law in Oswego, N. Y., and removed to Jackson, Mich., where he was admitted to the bar in 1842. He was elected to the legislature in 1846; became conspicuous in the convention which established the Republican party in Michigan; and was elected governor of Michigan in 1860. He was a member of Congress (1866-70).

Blair, Francis Preston, American journalist and politician: b. Abingdon, Va., 12 April 1791; d. Silver Spring, Md., 18 Oct. 1876. In early life he was a Jacksonian Democrat. He edited the *Washington Globe* from 1830 to 1845. Through his anti-slavery sentiments he became one of the founders of the Republican party, but in later years returned to the Democratic faith.

Blair, Francis Preston, Jr., American soldier and statesman (son of the preceding): b. Lexington, Ky., 19 Feb. 1821; d. St. Louis, Mo., 5 July 1875. He was a representative in Congress from Missouri (1857-9 and 1861-3); became a major-general in the Union army in the Civil War, taking an active part in the Vicksburg campaign and Sherman's march to the sea; was an unsuccessful Democratic candidate for Vice-President in 1868, and United States senator (1870-3).

Blair, Henry William, American legislator: b. Campton, N. H., 6 Dec. 1834. He received an academic education; was admitted to the bar in 1859; served through the Civil War, becoming lieutenant-colonel of the 15th New Hampshire Volunteers, and was twice wounded. After serving in both branches of the State legislature he was a member of Congress (1875-9 and 1893-5), and United States Senator (1879-89). He is the author of what was known as the 'Blair Common School Bill,' designed to distribute a certain amount of Federal money for educational purposes among the various States in proportion to the number of illiterates. He was a strong opponent of Chinese immigration, and, when he was appointed and confirmed United States minister to China,

that government objected to receiving him. He has been an active worker in the cause of temperance and other reforms.

Blair, Hugh, Scottish divine: b. Edinburgh, 7 April 1718; d. 27 Dec. 1800. He commenced his academic career at Edinburgh University in 1730. In 1741 he was licensed as a preacher, and the following year was ordained to the parish of Collessie, Fife, but a few months after he was elected to the second charge of the Canongate, Edinburgh. In 1754 he received one of the city charges, that of Lady Yester's church, and in 1758 one of the charges of the High Church. In 1759 he commenced a course of lectures to students upon the principles of literary composition; and in 1762 he was made professor of rhetoric and belles-lettres in the University of Edinburgh, being the first that ever occupied this chair. He continued the course till 1783, when he published his lectures, which received very high praise. In 1763 he published a dissertation on the 'Poems of Ossian,' in the authenticity of which he firmly believed.

It was not till 1777 that he could be prevailed upon to offer to the world any of those sermons with which he had so long delighted a private congregation. One of the sermons having been sent by Strahan, the king's printer, to Dr. Johnson for his opinion, Strahan received from him the following characteristic note: "I have read over Dr. Blair's first sermon with more than approbation; to say it is good is to say too little." Strahan thereupon agreed to purchase the volume, with Mr. Cadell, for \$500. The sale was so rapid and extensive, and the approbation of the public so high, that the proprietors voluntarily doubled the stipulated price. The volume speedily fell under the attention of George III., and by royal mandate a pension of \$1,000 a year was bestowed on Dr. Blair. During the subsequent part of his life Dr. Blair published three other volumes of sermons; and it might safely be said that each successive publication only tended to deepen the impression produced by the first.

Blair, James, American clergyman and educator: b. Scotland, 1656; d. Williamsburg, Va., 1 Aug. 1743. In 1685 he was sent as a missionary to Virginia by Dr. Compton, Bishop of London. There he secured the confidence of the planters, and proved himself far in advance of his contemporaries on the question of slavery. In 1689 Sir Francis Nicholson appointed him "commissary," the highest ecclesiastical office in the colony. This office gave him a seat in the Council of the colonial government; he presided over the trials of clergymen, and pronounced sentence upon conviction of crimes or misdemeanors. His great desire was to see a college established in the colony. The Assembly and governor warmly sympathized with his project; he went to England and laid his plan before William and Mary, and on 14 Feb. 1692, a charter for the college was granted, the bishop of London being appointed chancellor and Blair president, and the institution named "William and Mary." Its opening was repeatedly delayed, and Blair did not enter on his duties as president until 1729, but his enthusiasm never wavered, and his efforts were finally crowned with success. He left his library to the college. He wrote 'Our Saviour's Divine Sermon on the Mount' (London 1722, 4 vols.; 3d ed. 1740). a

BLAIR—BLAKE

work highly considered throughout the 18th century.

Blair, John, Scotch chronologist and geographer: d. 24 June 1782. He went to London about the middle of the 18th century. In 1754 the publication of a work in folio, entitled 'The Chronology and History of the World from the Creation to 1753 A.D.,' gained him great reputation. He dedicated his work to Lord Chancellor Hardwicke, and in 1757 was appointed chaplain to the Princess Dowager of Wales, and mathematical tutor to the Duke of York, whom he accompanied, in 1763, on a tour to the Continent, having already received several ecclesiastical preferments. On his return to England he published, in 1768, a new edition of his 'Chronological Tables,' with 14 maps of ancient and modern geography annexed.

Blair, John Insley, American philanthropist: b. Belvidere, N. J., 22 Aug. 1802; d. 2 Dec. 1899. In early life he was a merchant and banker; subsequently becoming the individual owner of more miles of railroad property than any other man in the world. He acquired a very large fortune; loaned the Federal government more than \$1,000,000 in the early part of the Civil War; built and endowed at a cost of more than \$600,000 the Presbyterian Academy in Blairstown, N. J.; rebuilt Grinnell College, Iowa; erected Blair Hall and made other gifts to Princeton University; was equally liberal to Lafayette College; and had erected more than 100 churches in different parts of the West, besides laying out many towns and villages on the lines of his numerous railroads.

Blair, Montgomery, American lawyer: b. Franklin County, Ky., 10 May 1813; d. Silver Springs, Md., 27 July 1883. He was graduated at the United States Military Academy in 1835; resigned from the army, 1836; was admitted to the bar, 1839, and began practice in St. Louis. He was judge of the court of common pleas, 1843-9; removed to Maryland in 1852; was United States solicitor in the court of claims, 1855-8. He acted as counsel for the plaintiff in the widely known Dred Scott case. In 1861-4 he was postmaster-general. In 1876-7 he acted with the Democratic party in opposing Hayes' title to the office of President.

Blair, Robert, Scotch clergyman and poet: (eldest son of the Rev. David Blair, one of the ministers of Edinburgh, and chaplain to the king): b. Edinburgh, 1699; d. Athelstaneford, 1746. He was ordained, in 1731, minister of Athelstaneford, in East Lothian, where he spent the remainder of his life. He was a man of learning and of elegant taste and manners. A botanist and florist; he was also skilled in optical and microscopical knowledge, on which subjects he carried on a correspondence with some learned men in England. He was a man of sincere piety and very assiduous in discharging the duties of his clerical functions. His best-known poem, 'The Grave,' was chiefly composed before his ordination. It was first printed in 1743, and is now esteemed as one of the standard classics of English poetical literature, in which rank it will probably remain longer than many works of greater contemporary or even present fame.

Blake, Edward, English statesman: b. Cairngorm, Ont., Canada, 13 Oct. 1833. He was

educated at Upper Canada College and Toronto University; was called to the bar in 1856 and engaged in practice in Toronto. He entered public life in 1867; was premier of Ontario, 1871-2; minister of justice, 1875-7, and the recognized leader of the Canadian Liberal party, 1880-91. He declined the appointments of chancellor of upper Canada in 1869, chief justice of Canada in 1875, and chief justice of Ontario in 1897, and also the honor of knighthood. In 1892 he was invited by the leaders of the Anti-Parnellites in Ireland to enter the British House of Commons as the representative of an Irish constituency. Consenting, he removed to South Longford, was elected for that district, and in 1895 was re-elected. In 1896 he was appointed a member of the judiciary committee of the privy council.

Blake, Eli Whitney, American inventor: b. Westboro, Mass., 27 Jan. 1795; d. New Haven, 17 Aug. 1886. He graduated at Yale University in 1816, and began business with his uncle, Eli Whitney, in the manufacture of fire-arms. In 1834 he founded, near New Haven, Conn., the pioneer factory for the manufacture of domestic hardware. In 1857 he invented the widely-known stone- and ore-crusher called the Blake crusher, which introduced a new era in road-making and mining industries, and is used throughout the world.

Blake, Francis, American inventor: b. Needham, Mass., 25 Dec. 1850. He served for 13 years on the United States Coast Survey, part of the time engaged in field work and its reduction to determine differences of longitude between the observatories at Greenwich, Paris, Cambridge, and Washington. Having devoted himself to the study of experimental physics, in 1878 he invented the famous Blake transmitter, which is the telephonic transmitter now most widely used throughout the world. He has also patented other electrical devices.

Blake, John Laurie, American clergyman and author: b. Northwood, N. H., 21 Dec. 1788; d. Orange, N. J., 6 July 1867. He was educated at Phillips Exeter Academy and at Brown University. He first entered the Congregational ministry, but in a short time became an Episcopalian and was ordained in that Church. He settled in Pawtucket, and later in Hopkinton, N. H., and in 1822 removed to Boston. He continued to teach in this school till 1830, then devoted himself to literary work. While a teacher he published several text-books, prepared for his own classes, and was editor of the 'Gospel Advocate.' His greatest work, a 'Biographical Dictionary,' was first published in 1835.

Blake, Mrs. Lillie (DEVEREUX) Umstead, American advocate of woman's rights and novelist: b. Raleigh, N. C., 1835. Her first husband, Frank G. Quay Umstead, died in 1859; she married Grenfill Blake in 1866, who died in 1896. She has written and spoken much on woman suffrage, and her novels bear on this theme. She has written 'Southwold' (1859); 'Rockford' (1863); 'Fettered for Life' (new ed. 1885); 'Woman's Place To-Day' (1883), a reply to Dr. Morgan Dix's 'Lenten Lectures on Women,' which attracted attention; etc. In 1900 she was president of the Civic and Equality Union.

BLAKE

Blake, Mary Elizabeth McGRATH, American poet and writer: b. Dungarven, Ireland, 1 Sept. 1840. In verse she has written 'Poems' (1882); 'Youth in Twelve Centuries' (1886); etc. Of her travels may be named 'On the Wing' (1883); 'A Summer Holiday.'

Blake, Robert, British admiral: b. Bridgewater, Somerset, August 1599; d. 17 Aug. 1657. After attending the grammar school of his native place he was sent to Wadham college, Oxford, where he took the degree of B.A. in 1617. On his return to Bridgewater he lived quietly on the fortune left him by his father, and was led to embrace the principles of the Puritans, by whose interest he was elected member for Bridgewater in the Parliament of 1640. This being soon dissolved, he lost his election for the next, and immediately sought to advance the cause in a military capacity in the war which then broke out between the king and the Parliament. He soon distinguished himself by his activity. In 1649 he was sent to command the fleet in conjunction with Cols. Deane and Popham, and thus commenced the naval career which has given him so distinguished a place in British history. He immediately sailed to Kinsale in quest of Prince Rupert, whom he attempted to block up in that port. The prince escaped to Lisbon, where Blake followed him; and, being refused permission to attack him in the Tagus by the king of Portugal, he took several rich prizes from the Portuguese (against whom the Parliament declared war), and followed Rupert to Malaga, where, without asking permission of Spain, he attacked him and nearly destroyed the whole of his fleet. On his return to England he was made warden of the Cinque Ports, and soon after reduced the islands of Scilly and Guernsey. In 1652 he was made sole admiral, and on the 19th of May was attacked in the Downs by Van Tromp with a fleet of 45 sail, the force of Blake amounting only to 23. He fought so bravely, however, that Van Tromp was obliged to retreat. He then continued his cruise, took a number of Dutch merchantmen, and after several partial actions drove the enemy into their harbor and returned to the Downs. On 29 May he was again attacked by Van Tromp, whose fleet was now increased to 80 sail. Blake engaged this vast force with a very inferior number and an unfavorable wind; but, after every possible exertion, was obliged to retreat into the Thames, on which Van Tromp was so much elated that he sailed through the Channel with a broom at his mast-head, to signify that he had swept the sea of British ships. In the February following, Blake, having with great diligence repaired his fleet, put to sea with 60 sail, and soon after met the Dutch admiral, who had 70 sail and 300 merchantmen under convoy. During three days a furious running fight up the Channel was maintained with obstinate valor on both sides, the result of which was the loss of 11 men-of-war and 30 merchant ships by the Dutch, while that of the English was only one man-of-war. It was in April of this year that Cromwell assumed the sovereignty, on which occasion Blake and his brother admirals issued a declaration that, notwithstanding this change, they resolved to persist in faithfully performing their duty to the nation. "It is not for us," said Blake to his officers, "to mind state affairs, but to keep the foreigners from fooling us." On 3

June he again engaged Van Tromp with dubious success; but, renewing the action the next day, he forced the Dutch to retire with a considerable loss in ships and men. On his return he was received by Cromwell with great respect, and returned member in the new Parliament for Bridgewater. Aware of his affection for a republican government, the protector was not displeased at having occasion to send him, with a strong fleet, to enforce a due respect to the British flag in the Mediterranean. He sailed first to Algiers, which submitted, and then demolished the castles of Goletta and Porto Ferino, at Tunis, because the dey refused to deliver up the British captives. A squadron of his ships also blocked up Cadiz and intercepted a Spanish plate fleet. Being now very sick, he resolved to do one more service to his country before his death, and sailed with 24 ships to Santa Cruz, in Teneriffe, and, notwithstanding the strength of the place, burned the ships of another Spanish plate fleet which had taken shelter there, and by a fortunate change of wind came out without loss. His brother having failed in some part of duty during this service, he immediately removed him from his command. Finding his disorder making rapid progress he then sailed for England, and expired while the fleet was entering Plymouth Sound. His body was honored with a magnificent public funeral, and interred in Westminster Abbey, whence it was, with pitiful spite, removed at the Restoration and buried in St. Margaret's churchyard. So disinterested was he that, after all his rich captures and high posts, he scarcely left behind him \$2,500 of acquired property, freely sharing all with his friends and seamen, into whom he infused that intrepidity and spirit of enterprise by which the British navy has been ever since so highly distinguished.

Blake, William, English poet, painter, and engraver: b. London, 28 Nov. 1757; d. 12 Aug. 1857. At the age of 10 he was sent to a drawing-school, and four years later he was apprenticed for seven years to the engraver James Basire, for whom he drew from the monuments in the older London churches and Westminster Abbey. In 1778 he studied in the Royal Academy, and about this time he began to engrave for the booksellers, among his chief productions being plates after Stothard for the 'Novelists' Magazine.' To the first exhibition of the Royal Academy he sent a drawing entitled 'The Death of Earl Godwin.' He married in 1782, and for the three years 1784-7 carried on a printseller's shop in partnership with another engraver. From his earliest years Blake was a mystic. He believed that all things exist in the human imagination alone, and had a wonderful power of imaginative vision which enabled him to see angels in trees and in fields, great men of past times, etc. His 'Songs of Innocence,' verse and designs (1789), and the companion 'Songs of Experience' (1794), were reproduced by himself and his wife by a process which he believed to have been revealed to him in a dream by a dead brother. Between 1793 and 1800 he produced a large number of designs, among them 537 illustrations for Young's 'Night Thoughts.' In 1800 he became acquainted, through Flaxman, with the poet William Hayley, who gave him artistic commissions, and for three years he lived in his neighborhood at Felperham. He next produced the designs to Blair's

'Grave' (engraved by Schiavonetti), which stand in the forefront of his artistic work. In 1808 he sent to the Royal Academy the pictures 'Christ in the Sepulchre Guarded by Angels,' and 'Jacob's Dream,' the last pictures he exhibited there. From 1813 till his death he had a staunch friend and patron in the painter John Linnell. It was about this time that he executed the series of pencil drawings known as 'Spiritual Portraits.' The highly prized woodcuts to Thornton's 'Virgil' were executed in 1820, and in 1825 he produced for Linnell his wonderful 'Inventions to the Book of Job,' which, containing 22 engravings, 21 original designs in colors, with the original colored drawings by the artist (the property of the Earl of Crewe), sold in London, in 1903, for \$28,000. He also executed a series of engravings and designs from the 'Divina Commedia.' At the sale just mentioned 12 drawings in colors for 'L'Allegro' and 'Il Penseroso' brought \$9,800, and the original colored issue of 'America, a Prophecy,' sold for \$1,475. Among Blake's other writings are: 'Poetical Sketches' (1783); 'Gates of Paradise' (1793); 'Prophetic Books,' sadly incoherent, but with splendid designs (1793-1804). The only complete edition of his works is that of E. J. Ellis and W. B. Yates (3 vols. 1893). Consult Gilchrist's 'Life' (1863), and 'Works' by Swinburne (1868), and Story (1893).

Blake, William Phipps, American mineralogist: b. New York, 1 June 1826. Graduating at the Sheffield Scientific School in 1852, he joined the United States Pacific Railroad exploring expedition (1853) as mineralogist and geologist. In 1861 he became mining engineer for the Japanese government, and with R. Pumpelly organized the first school of science in Japan. As an expert in his specialty he was connected in important capacities with the Paris Exposition of 1867, the Vienna Exposition (1873), United States Centennial Exhibition (1876), Paris Universal Exposition (1878), and drafted the system of classification of United States ores and minerals at the Columbian Exposition (1893). He has conducted important explorations in Alaska, California, and Nevada, and the chief mining districts of the United States, frequently publishing his results in valuable reports and scientific papers. Publications: 'Silver Ores and Silver Mines' (1861); 'California Minerals' (1863); 'Production of the Precious Metals' (1867); 'Iron and Steel' (1873); 'Ceramic Art and Glass' (1878); 'History of the Town of Hamden, Conn.'; 'Life of Captain Jonathan Mix.'

Blake, William Rufus, American actor: b. Halifax, N. S., 1805; d. Boston, 22 April 1863. His first appearance on the American stage was at the old Chatham Theatre, New York, under the management of Mr. Barrere, in 1824, as Frederic in 'The Poor Gentleman,' and in Elliston's favorite character in 'The Three Singles.' His success was great. Jesse Rural, in 'Old Heads and Young Hearts,' was one of his best parts. Mr. Blake was a fluent and effective speaker. He was stage manager of the Tremont Theatre, Boston, joint manager of the Walnut Street Theatre, Philadelphia, and stage manager of the Broadway Theatre, New York.

Blakeley, Johnston, American naval officer: b. near Seaford, County Down, Ireland,

October 1781; lost at sea, 1814. His father emigrated to the United States in 1783, and eventually made his home in Wilmington, N. C. Johnston graduated at the University of North Carolina in 1800, and on 5 February of that year entered the navy as midshipman, and rose to the rank of captain. On 1 May 1814 he left Portsmouth, N. H., in command of the new sloop-of-war Wasp, and very shortly appeared in the English Channel, spreading terror among the merchant ships and seaport towns. On 28 June he fought and defeated the British sloop Reindeer, for which exploit Congress voted him a gold medal. On 1 September he destroyed the Avon and on the 21st, near the Azores, took the Atlanta, which he sent home to Savannah. On 9 October the Wasp was spoken by the Swedish bark Adonis; and that was the last ever heard of the vessel and of those on board of her. It seems probable that, being heavily armed and sparred, the vessel foundered in a gale.

Blakelock, Ralph Albert, artist: b. New York, 15 Oct. 1847. He graduated at the College of the City of New York in 1867, and it was intended that he should follow his father's profession of medicine, but he developed a strong taste for music and the arts, and without a master taught himself painting. He has painted landscapes, moonlight scenes, and Indian figures; one of the last-named represents the Ta-vo-kok-i, or circle-dance of the Kavavite Indians. His work is very striking on account of its harmonious color-schemes. His studio is in New York.

Blakesley, Joseph Williams, English clergyman: b. London, 6 March 1808; d. Lincoln, 18 April 1885. He graduated at Trinity College, Cambridge, in 1831; was Fellow there 1831-45, and select preacher 1840-3; became a member of the New Testament Committee on Bible Revision in 1870; became dean of Lincoln in 1872. His publications include 'Life of Aristotle' (1839); 'Conciones Academicæ' (1843); and an edition of 'Herodotus' (2 vols., 1852-4).

Blakey, Robert, English writer: b. Morpeth, Northumberland, 18 May 1795; d. Belfast, 26 Oct. 1878. He bought the Newcastle *Liberator* in 1838, and got himself into trouble with the government on account of certain alleged seditious articles which he published. In 1848 he became professor of logic and metaphysics at Queen's College, Belfast. Among his works are 'Treatise on the Divine and Human Wills'; 'History of Moral Science'; 'Historical Sketch of Logic'; 'Temporal Benefits of Christianity'; and 'The Angler's Song Book.'

Blanc, blôn, Anthony, American clergyman: b. Sury, France, 11 Oct. 1792; d. New Orleans, 20 June 1860. He was ordained to the Roman Catholic priesthood in 1816; went to Annapolis, Md., in 1817; was appointed bishop of New Orleans in 1835; and became archbishop there in 1850.

Blanc, Jean-Joseph-Louis, zhôn-zhō-sěf-loo-ē, French historian, publicist, and socialist: b. Madrid, 29 Oct. 1811; d. 6 Dec. 1882. He studied with great success in the college at Rodez, and completed his education at Paris. He was for a short time an attorney's clerk, afterward a teacher of mathematics and a private tutor. Subsequently at Paris he devoted him-

BLANC — BLANCHARD

self to the career of journalism, fighting stoutly in the ranks of the militant democracy. In 1839 he founded the *Revue du Progrès*, in which first appeared his great work on socialism, 'De l'Organisation du Travail' (separately published in 1840). In this work he condemns individual and competitive rivalry in labor; society should not be subjected to a perpetual combat, but should form a harmonious whole, in which each member should contribute according to his abilities and be recompensed according to his needs. In 1841-4 appeared his 'Histoire de Dix Ans' (1830-40), in which he vigorously exposed the trickery and jobbery of the government of Louis Philippe, and which greatly contributed to bring about its downfall. On the outbreak of the revolution of 1848 Blanc was elected a member of the provisional government, and appointed president of the commission for the discussion of the question of labor. He has been unjustly charged with creating and organizing the disastrous scheme of national workshops, a scheme which he strenuously opposed. After the closing of these workshops, and the June insurrection of 1848, he was prosecuted for conspiracy, but escaped to England, where he took up a lengthened residence. During this period he wrote the bulk of his famous 'Histoire de la Révolution Française' (12 vols. 1847-62). His other works are: 'Lettres sur l'Angleterre' (1865-7); 'Histoire de la Révolution de 1848' (1870); 'Questions d'Aujourd'hui et de Demain' (1873-4); etc. On the downfall of the second empire (1870) Blanc returned to Paris and became a member of the National Assembly in 1880.

Blanc, Ludwig Gottfried, lood'vīg got'-fréd, German philologist: b. Berlin, 19 Sept. 1781; d. Halle, 18 April 1866. He was educated at the French Theological Seminary in Berlin and ordained as pastor at Halle. In 1811 he was accused of taking part in a conspiracy against the king of Westphalia, and was imprisoned at Magdeburg, and later at Kassel, until released in 1813 by a Russian skirmishing corps. He was chaplain in the Prussian army in the war of 1814-15; from 1822 was professor of the Romance languages at the University of Halle; and in 1860 was appointed preacher at the cathedral in that city. He was an authority on the Romance languages and especially on the works of Dante. In connection with his study of Dante he wrote a 'Dante Vocabulary' (in French); 'Attempt at a Philological Explanation of Several Disputed Points in the "Divine Comedy"' and translated the 'Divine Comedy' into German. He has written also 'Grammar of the Italian Language'; and a 'Handbook of the Most Remarkable Facts of Nature and the History of the Earth and Its Inhabitants.'

Blanc, Marie Thérèse, mā-rē tā-rāz (THÉRÈSE BENZON), French novelist and littérateur: b. Seine-Port, 21 Sept. 1840. She has been for many years on the editorial staff of the 'Revue des Deux Mondes,' to which she has contributed notable translations and reviews of many American, English, and German authors. Her literary essays on these contemporaneous writers were collected in 'Foreign Literature and Customs' (1882), and 'Recent American Novelists' (1885). Her first work to attract attention was 'A Divorce' (1871), published in

the 'Journal des Débats.' Two other novels, 'A Remorse' (1879), and 'Tony' (1889), were crowned by the French Academy. Other stories are 'Georgette' and 'Jacqueline' (1893); 'Condition of Woman in the United States' (1895).

Blanc, Paul Joseph, pōl zhō-zef, French genre painter: b. Paris 1846; d. Paris 5 July 1904. He studied under Bin and Cabanel. He won the Grand Prix de Rome in 1867; the first-class medal of the Paris Salon in 1872; the decoration of the Legion of Honor in 1878; and the first-class medal in the Paris Exposition of 1889. One of his best-known works is a decorative composition depicting the consecration, baptism, and triumph of Clovis.

Blanc, Mont. See MONT BLANC.

Blanchard, blān-shard, Edward Laman, English dramatist and novelist: b. London, 1820; d. 1889. His novels, 'Temple Bar' and 'A Man Without a Destiny,' evinced no special talent for story-telling; on the other hand he composed for Drury Lane Theatre about 100 Christmas pantomimes in the vein of grotesque burlesque, among them 'Sinbad the Sailor,' which were received with unbounded popular favor.

Blanchard, Emile, ā-mēl blōn-shār, French naturalist: b. Paris, 6 March 1819. He is especially renowned as an entomologist, and is the author of many scientific works, including 'Researches into the Organization of Worms' (1837); 'Natural History of Orthopterous and Neuropterous Insects' (1837-40); 'History of Insects, etc.' (1843-5).

Blanchard, François, frān-swā, French aeronaut: b. 1753; d. 1809. He displayed great ingenuity by the invention of a hydraulic machine in the 19th year of his age, and afterward in the construction of a flying ship, which, by means of a counterpoise of six pounds, was raised to more than 20 feet from the ground. He eagerly availed himself of the discoveries of the brothers Montgolfier, and the improvements of the same by Prof. Charles and M. Robert in Paris. After having made his first aerostatic voyage, 4 March 1784, he crossed the Channel from Dover to Calais, 1785, with Dr. Jeffries, a gentleman of Boston. For this exploit he was rewarded by the king of France with a present of \$2,400 and a pension of \$240. In the same year, at London, he first made use of a parachute invented by him, or, according to others, by Etienne Montgolfier. After having performed many aerostatic voyages in foreign countries also, he was accused of propagating revolutionary principles, and imprisoned (1793) in the fortress of Kufstein, in the Tyrol. Having obtained his liberty, he made his 46th ascent in the city of New York in 1796. In 1798 he ascended with 16 persons in a large balloon at Rouen, and descended at a place 15 miles distant. In 1807 his aerostatic voyages amounted to more than 66. His wife continued to make aerial voyages. In 1811 she ascended in Rome, and after going a distance of 60 miles she rose again to proceed to Naples. In June 1819 having ascended from Tivoli, in Paris, her balloon took fire at a considerable height, from some fire-works which she carried with her. The car fell in the Rue de Provence, and the aeronaut was dashed to pieces.

BLANCHARD — BLANCHING

Blanchard, Jacques, zhâk, French painter: b. Paris, 1600; d. 1638. He received the first lessons of his art from Bellori, his maternal uncle, studied some time at Lyon, and in 1624 repaired to Rome. After two years he visited Venice, studied the works of Titian and the other great colorists of his school, and executed several paintings which gave him a name. After his return to Paris he executed a great number of works, which procured him the surname of "the French Titian." His best piece, a 'Descent of the Holy Spirit,' is in the cathedral at Nôtre Dame.

Blanchard, Jonathan, American educator: b. Rockingham, Vt., 19 Jan. 1811; d. Wheaton, Ill., 14 May 1892. He graduated at Lane Theological Seminary in 1832 and was ordained a Presbyterian minister in 1838. He was American vice-president of the World's Anti-Slavery Convention in London in 1843; and in 1846 became president of Knox College at Galesburg, Ill. He was president of Wheaton College, Ill., 1880-2; and, on resigning, was chosen president-emeritus, and subsequently gave most of his time to editing 'The Christian Cynosure.'

Blanchard, Thomas, American inventor: b. Sutton, Worcester County, Mass., 24 June 1788; d. 16 April 1864. He joined his brother in the manufacture of tacks by hand, and at the age of 18 commenced his invention of a tack-machine, which in six years he brought to such perfection that by placing in the hopper the iron to be worked, and applying the motive power, 500 tacks were made per minute with better finished heads and points than had ever been made by hand. He sold the patent for \$5,000. About this time various attempts were made in the United States armories at Springfield and Harper's Ferry, to turn musket-barrels with a uniform external finish. Blanchard undertook the construction of a lathe to turn the whole of the barrel from end to end, by the combination of one single self-directing operation. About three inches of the barrel at the breech was partly cylindrical and partly with flat sides; these were all cut by the same machine, ingeniously changing to a vibrating motion as it approached the breech. The superintendent of the Springfield armory contracted with Mr. Blanchard for one of his machines. While it was in operation one of the workmen remarked that his own work of grinding the barrels was done away with. Another, employed on the wooden stocks, which were then all made by hand, said that Blanchard could not spoil his job, as he could not make a machine to turn a gunstock. Blanchard answered that he was not sure, but he would think about it, and as he was driving home the idea of his lathe for turning irregular forms suddenly struck him. The principle of this machine is, that forms are turned by a pattern the exact shape of the object to be produced, which in every part of it is successively brought in contact with a small friction-wheel; this wheel precisely regulates the motion of chisels arranged upon a cutting wheel acting upon the rough block, so that as the friction-wheel successively traverses every portion of the rotating pattern, the cutting wheel pares off the superabundant wood from end to end of the block, leaving a precise resemblance of the model. This remarkable machine, with modifications and improvements, is in use in the

national armories as well as in England, and in various forms is applied to many operations in making musket-stocks, such as cutting in the cavity for the lock, barrel, ramrod, butt-plates, and mountings, comprising, together with the turning of the stock and barrel, no less than 13 different machines. Beside gunstocks, it is also applied to a great variety of objects, such as busts, shoe lasts, handles, spokes, etc. Mr. Blanchard was also interested at an early day in the construction of railroads and locomotives, and in boats contrived to ascend rapid rivers. He also invented a machine for cutting and folding envelopes, a steam wagon, and a process for bending heavy timbers.

Blanche of Bourbon, Castilian queen: b. 1338. She was the daughter of Peter, Duke of Bourbon, and in 1353 married Peter, king of Castile, surnamed the Cruel. Don Frederick, Peter's natural brother, had been deputed to meet her at Narbonne and bring her into Spain, and she is said to have so far forgotten herself as to conceive a violent passion for him. Rumors to this effect had reached the king's ears, and though he celebrated the marriage he soon showed that he had placed his affections elsewhere. He shortly after declared the marriage null, imprisoned the queen in the castle of Medina Sidonia, and is said to have gotten rid of her by poison.

Blanche of Castile, French queen: b. 1187; d. Milan, November 1252. She was the daughter of Alphonso IX., married Louis VIII. of France and became the mother of Louis IX. ("St. Louis"). On the death of her husband she anticipated the formal appointment of a regency by procuring the immediate coronation of her son, and during his minority held the reins of government in his name with distinguished ability and success. In 1244, when St. Louis took his departure for the Holy Land she again became regent and gave new proofs of her talents and virtues. Her days are said to have been shortened by the long absence of her son, and a prevailing rumor that he had resolved to remain permanently in Palestine.

Blanche, August Théodor, ow'goost tâ'ô-dôr blânsh, Swedish dramatist and novelist: b. Stockholm, 17 Sept. 1811; d. Stockholm, 30 Nov. 1868. His comedies and farces,—more particularly 'Jenny, or the Steamboat Trip'; 'The Doctor'; 'The Rich Uncle'; and 'The Foundling'—have made all Sweden laugh; while his realistic fictions,—among them 'The Spectre'; 'Tales of a Cabman,' and 'Sons of North and South,'—are eagerly read.

Blan'chet, Joseph Goderick, Canadian statesman: b. Saint Pierre, 1829. He studied medicine, graduating from the College of Saint Anne; but has been especially active in public life; he has been mayor of Lévis, speaker of the Provincial legislature of Quebec for seven years, and member of the Canadian Assembly, from which he resigned on account of the law on dual representation.

Blanching, the process which prevents or checks the formation of chlorophyll and other substances in plants by excluding light. It alters the flavor as well as lightens the color of celery, sea-kale, asparagus, etc., and is generally accomplished by covering the plants with earth, boards, straw, paper, etc., or, in a small way, by inverted flower-pots, kegs, barrels, etc.

BLANCO — BLAND

Blanco, Antonio Guzman, ān-tō'nyō gooz'-mān blān'kō, Venezuelan soldier: b. Caracas, 29 Feb. 1828; d. 29 July 1899. He became prominent in the Federalist revolts, 1859-63, and, when his party triumphed, was made first vice-president in 1863 under Falcon, who was deposed in the revolution of 1868. Blanco led a successful counter-revolution in 1870, became president, and retained the office till 1882. In 1893 he was appointed minister to France, where he resided till his death.

Blanco, Jose Felix, hō'sa fā-lēks, Venezuelan historian: b. Mariana de Caracas, 24 Sept. 1782; d. Caracas, 8 Jan. 1872. At different times he acted in the capacity of priest, soldier, and statesman. He was one of the leaders in the revolution at Caracas, 19 April 1810, and was the first editor of the great historical work, 'Documentos para la historia de la vida publica del Libertador,' etc.

Blanco, Pedro, pā'drō, Bolivian statesman: b. Cochabamba, 19 Oct. 1795; d. Sucre, January 1829. He joined the Spanish army in 1812, but soon deserted to the patriots, and served with them till the end of the revolution. In 1828 he became a general, and in the same year, when Sucre fell, was made president of Bolivia, but was superseded in the revolution of 31 Dec. 1828. He was shot in Sucre.

Blanco, Ramon y Arenas, rā'mōn ē a-rā-nas, MARQUIS DE PENA PLATA, Spanish soldier: b. San Sebastian, Spain, 1833; d. Madrid, 4 April 1906. He began his military career in 1855 as lieutenant; was promoted captain in 1858, and won the rank of lieutenant-colonel in the war with San Domingo. In 1894 Blanco went to the Philippines as governor of Mindanao. When he returned to Spain he was assigned to the Army of the North, and in the war with the Carlists made a brilliant record. He successfully stormed Pena Plata, for which achievement he was created a marquis with that title. He succeeded Gen. Weyler as captain-general in Cuba, and his career was marked by deeds of blood and violence. When in command at the Philippines he ordered 169 prisoners to be thrown into a dungeon, where they were left for two days. When the guard opened the door they were all dead from asphyxiation. In the second Cuban insurrection 1,500 defenseless prisoners were slaughtered by his orders. At Cavité the Spanish captured several native leaders, and, by Blanco's instructions, after being tortured, the unhappy wretches were disemboweled and their bleeding bodies hung on the gates of the city. The Spanish government permitted him to resign his post in Cuba before the day set for the American occupation.

Blanco, Encalada, Manuel, mā-noo-el blān-ko-ēn-kā-lā'da, Spanish-American soldier: b. Buenos Ayres, 5 Sept. 1790; d. 5 Sept. 1875. He distinguished himself in the Chilean war of independence. He was chosen president of Chile in July 1826, but soon resigned and was made general of the army. He unsuccessfully invaded Peru in 1837, and was not allowed to retire till he had signed a treaty of peace. Chile annulled this treaty, and he was court-martialed, but freed. In 1847 he was intendant of Valparaiso, and in 1853-8 minister to France.

Blanco, blān'kō, Cape (literally, "white cape"), a name given to a great number of capes by the Spaniards, Portuguese, and Italians. It corresponds to the French *cap blanc*. The name is as common and as unphilosophical as that of White Hill, Black River, etc. The cape best known by this name is a headland on the west coast of Africa, in lat. 20° 47' N., and lon. 16° 58' W., the extremity of a rocky ridge which projects from the Sahara in a westerly direction, and then bending southward forms a commodious harbor called the Great Bay. Cape Blanco was first discovered by the Portuguese in 1441.

Bland, Edith Nesbit (E. NESBIT), English writer: b. London, 15 Aug. 1858. She was married to Hubert Bland, 1879. She has written several volumes of verse, as well as a series of popular children's books and several novels. Her published works include: 'Lays and Legends' (1886-92); 'Leaves of Life' (1888); 'A Pomander of Verse' (1895); 'Grim Tales' (1893); 'Something Wrong' (1893); 'The Marden Mystery' (1896); 'Songs of Love and Empire' (1897); 'The Secret of Kyriels' (1898); 'The Story of the Treasure Seekers' (1899); 'Pussy and Doggy Tales' (1899); 'The Book of Dragons' (1900); 'The Would-be Goods'; 'Nine Unlikely Tales'; 'Thirteen Ways Home' (1901); 'Five Children and It' (1902); 'The Red House' (1902); with Hubert Bland, 'The Prophet's Mantle' (1889); with Barron, 'The Butler in Bohemia' (1894).

Bland, Richard Parks, American legislator: b. near Hartford, Ky., 19 Aug. 1835; d. Lebanon, Mo., 15 June 1899. He received an academical education, and, between 1855 and 1865, practised law in Missouri, California, and Nevada, and was engaged for some time in mining. In 1865 he settled in Rolla, Mo., and practised there till he removed to Lebanon in the same State. He was a member of Congress in 1873-95 and from 1897 till his death. In 1896 he was a conspicuous candidate for the presidential nomination in the Democratic National Convention, but on the fourth ballot his name was withdrawn, and the vote of his State was cast for William J. Bryan. Mr. Bland was best known as the leader in the Lower House of Congress of the Free-Silver movement, and the author of the Bland Silver Bill. At the time of his death he was a member of the committees on coinage, weights and measures, and expenditures on public buildings.

Bland, Theodorick, American military officer: b. Prince George County, Va., 1742; d. 1 June 1790; he studied medicine in the University of Edinburgh, and for a time practised in England. He returned home in 1764, wrote against Gov. Dunmore under the name of Cassius; and was active in his profession until the outbreak of the Revolutionary War, when he sided with the Colonists, and became captain of the first troop of Virginia cavalry. In 1777 he joined the main army as a lieutenant-colonel, and later became a colonel. He distinguished himself at the battle of Brandywine, and was placed in command of the prisoners taken at Saratoga, who were marched to Charlottesville, Va. In 1780-3 he was a member of the Continental Congress, and was a representative from Virginia to the First Federal Congress in 1789.

BLANK VERSE — BLANQUI

Blank Verse, verse without rhyme. This was the invariable form of the poetry of the ancients, but it is now peculiar to the Italian, English, and German languages. The poetry of the Anglo-Saxons and the earliest English poetry was not rhymed, yet it is not generally called blank verse, as their versification had a peculiarity of its own called alliteration. When rhyme, however, was once introduced into English verse, it was for a long time regarded as the exclusive form of versification, and the Earl of Surrey, who was beheaded by order of Henry VIII. in 1547, is said to have been the first to use blank verse in England, namely, in his translation of the second and fourth books of Virgil's *'Æneid.'* The most common form of blank verse in English poetry is the decasyllabic, such as that of Milton's *'Paradise Lost'* and the dramas of Shakespeare. From Shakespeare's time it has been the kind of verse almost universally used by dramatic writers. Dryden, indeed, after the Restoration, introduced rhyme into his tragedies, in imitation of the French rhymed plays; but after keeping the stage for a number of years, they became intolerable to the English ear, and the introduction of rhyme into the drama has never since been attempted in England. Shakespeare not uncommonly ends a scene with a few lines of rhyme, although the rest of the scene is in blank verse, and in the subordinate play interwoven with the action of Hamlet blank verse is used throughout. The first use of the term blank verse is said to be in Hamlet, ii. 2: "The lady shall say her mind freely, or the blank verse shall halt for't."

Blanket (that is "fine white" goods), a heavy bed or horse cover, of a fabric with a thick soft nap on both sides. Originally made entirely of wool, and still so in the finest grades, the bulk of medium and cheap blankets are now made with a cotton chain or warp and a wool filling, as cheaper, stiffer, and little less durable in good condition. In the finest grades of American blankets, the filling is Australian wool, the longest and softest fibre known; the warp of American wool. The cheapest ones have for filling the shorter combings of wool, shoddy, etc.; ordinary horse blankets the same or still coarser half-cleaned wool, and largely animal hair. Of late also an immense quantity of all-cotton blankets are made, the nap being cotton wool; these have competed less with wool blankets than with comfortables, whose sale for a time they cut in half. They are used for economy, where heavy blankets are not needed, and to replace cotton sheeting in cold rooms, for children, etc. The most famous blankets in the world are those of the Mysore in India, so delicate that one 18 feet long can be rolled inside a hollow bamboo. In the United States they are a specialty in southwestern Indian domestic manufacture, especially among the quite civilized Navajos (q.v.), whose rough hand looms and stick shuttles turn out blankets weighing 20 pounds or more, and selling for \$1 and \$2 a pound, much prized by Alaskan and Klondike gold-seekers. But of civilized manufacture, the finest are from California, Nevada, and Oregon, and from Minneapolis; some of these retail for \$25 per pair with a weight of less than 10 pounds. Maine, Ohio, and West Virginia also produce very fine goods. Below the above fancy price, of which

much is loading for short runs, prices range for all-wool blankets from \$20, the highest usually kept in stock, down to \$7.50, and for cotton-warp down to \$2, all-cotton, \$1. Few blankets have been imported into this country since 1860. The early manufacture here was "a series of costly and futile experiments," except a few coarse ones for army or navy use, and for slaves on plantations, for which in 1831 a mill was started in Pendleton, S. C.; another to make "Indian" blankets was opened in Buffalo the same year. But the first effective attempt was under the sharp tariff of 1842, soon swept away by the moderate one of 1847. The tariff bill of 1857, however, which formed one of the southern counts for secession, taxed imported blankets so heavily that by 1861 importations had practically ceased. In 1860 the United States' total manufacture was 616,400 pairs, mainly in New England, Pennsylvania, and California. In 1880 this had increased to 4,400,000, gross value \$6,840,000, and the prices had dropped so much that the cheaper grades had gone out of use; the foreign commissioners at the Centennial of 1876 reported that for weight, thickness, softness, and perfection of surface, nothing in Europe compared with the American, and that the European cheaper grades could not be sold even to the Indians. But competition had so glutted the market that in 1878 a great auction was held in New York to clear them off, at heavy sacrifice. In 1890 the manner of report was changed to square yards,—20,793,644 of "house blankets," valued at \$7,153,900, and 5,507,074 of horse blankets, \$1,721,516. For some reason, probably the larger use of comfortables, the use of the all or part-wool article fell off heavily in the last decade—to 18,155,505 square yards, valued at \$5,200,959; though horse blankets increased to 7,315,304, valued at \$1,740,988 or about the same as before. The chief seats of manufacture were Pennsylvania for all-wool, and Massachusetts for cotton-warp, though Indiana, Minnesota, California, and several other States furnished large quantities.

The nap is formed in the finest grades, and till recently was so altogether, by pulling up the fibre with teazles; these have now been replaced in the cheaper makes with steel teeth or brushes on revolving cylinders, which, however, are too inflexible and liable to tear the goods to be trusted with expensive ones. The use of Jacquard patterns with two or three colors, in place of printed ones, is another change which has popularized blankets by increasing their beauty.

Blanqui, blân-ke, Jérôme Adolphe, French economist: b. Nice, 1798; d. 1854. While studying medicine at Paris he made acquaintance with Jean Baptiste Say, and was induced to devote himself to the study of economics. He succeeded Say in the *Conservatoire des Arts et Métiers* as professor of industrial economy. Blanqui, who favored a free-trade policy, published, among other works, *'Précis Élémentaire d'Économie Politique'* and *'Histoire de l'Économie Politique en Europe.'*

Blanqui, Louis Auguste, French revolutionist: b. Nice, 7 Feb. 1805; d. 1 Jan. 1881. He made himself conspicuous chiefly by his passionate advocacy of the most extreme political opin-

BLANQUILLO—BLASPHEMY

ious, for which he suffered with the pride of a martyr. He was one of the foremost fighters in all the French revolutions of the 19th century. In 1830 he was decorated for his valor at the barricades. In 1848 he figured as the chief organizer of the popular movement under the provisional government. He took the lead also in the revolutionary *attentat* of 15 May, the aim of which was to overthrow the Constituent Assembly. At the head of an excited mob he demanded of the French representatives the resuscitation of the Polish nationality, while one of his friends pronounced the dissolution of the Assembly. For his share in these disturbances he was rewarded with a 10 years' imprisonment in Belleisle. In 1861 Blanqui was sentenced to another imprisonment of four years. After the downfall of the second empire in 1870, Blanqui resumed his revolutionary activity, and, in 1871, took a prominent part in forming the Commune. Being too unwell to endure transportation to New Caledonia, he was condemned to imprisonment for life, from which he was released in 1879. He spent nearly half of his life in prison.

Blanquillo, *blan-kél'yō*, a fish of the Gulf of Mexico (*Caulolatilus chrysops*), related to the tile-fish. The name is also given in southern California to the yellow-tail (q.v.).

Blarney, Ireland, a village four miles northwest of the city of Cork, near the stream of same name, here crossed by a handsome bridge of three arches. It is a small but well-built place; and besides the parish church, contains a national school. Flax and cotton were formerly manufactured to some extent, but both of these branches have now decayed. Spinning and dyeing woolen yarn is, however, still carried on; and there is an extensive tweed manufactory employing a number of people. Blarney Castle stands on an isolated limestone rock at the junction of the Blarney and Comane. Erected in the 15th century, it was the scene of several interesting historical events; but derives its chief notoriety from a stone in its northeast angle, several feet from the top, bearing a Latin inscription, recording the date of the erection, and called the "Blarney Stone." To this stone tradition ascribes the faculty of communicating to all who kiss it that species of most persuasive fluency of speech commonly called "blarney." The "groves of Blarney" are extensive and interesting, and beneath the castle there are also some curious natural caves.

Bläser blē'zēr, **Gustav**, German sculptor: b. Düsseldorf, 9 May 1813; d. Cannstatt, 20 April 1874. He was associated 11 years with Rauch and for that time shared in all his work. In 1845 he went to Rome, but returned to Berlin when appointed to design one of the groups for the "Schlossbrücke." His group, 'Minerva Leading a Young Warrior to Battle,' is thought to be the best of the series. Among his other works are a statue of St. Matthew in the church at Helsingfors; the 'Prophet Daniel'; Barussia in the new museum at Berlin; the statues of Jeremiah, Daniel, and Charlemagne for the church at Potsdam; the equestrian statue of Frederick William III. at Cologne; 'Hospitality'; and many busts, including one of Lincoln and one of Washington.

Blashfield, **Edwin Howland**, American artist: b. New York, 15 Dec. 1848; studied in Paris under Léon Bonnat; and began exhibiting

in the Paris Salon in 1874. He returned to the United States in 1881, and has since distinguished himself by the execution of large decorative works. Among his noteworthy productions in this line are one of the domes of the Manufacturers' building in the World's Columbian Exposition, the great central dome of the Library of Congress, and the new apartment of the appellate court in New York; besides ceiling and panel work in the residences of C. P. Huntington, W. K. Vanderbilt, and George W. C. Drexel, and in the Astoria ballroom and several clubhouses in New York.

Bla'sius, **St.**, or **St. Blaise**, Bishop of Sebaste, in Armenia, is said to have suffered martyrdom about 316, by order of Agricola, governor of Cappadocia and little Armenia. His feast day is celebrated in the Greek church on 11 February and he is commemorated in the oldest martyrologies of the Roman church. In the Roman Martyrology, 3 February is assigned to him. He is the patron saint of wool-combers, his flesh having been torn by iron combs. He is especially invoked in diseases of children and animals, and ailments connected with the throat are more particularly in his province.

Blasphemy, is somewhat variously defined. According to the most general definition, it means the speaking irreverently of the mysteries of religion; and formerly, in Roman Catholic countries, it also included the speaking contemptuously or disrespectfully of the Holy Virgin or the saints. Public blasphemy has been considered by the Catholic Church as an unpardonable sin, and it was formerly punished with death by the municipal laws. The 77th novel of Justinian assigned this punishment to it; and the capitularies inflicted the same punishment upon such as, knowing of an act of blasphemy, did not denounce the offender. The former laws of France punished this crime with fine, corporal punishment, the gallows, and death, according to the degree and aggravation of the offense. The records of the parliaments supply numerous instances of condemnation for this crime, and many of punishment by death; others of branding and mutilation. A man was for this offense condemned to be hanged, and to have his tongue afterward cut out, and the sentence was executed at Orleans as late as 1748. But it is remarked by a writer in the French 'Encyclopédie Moderne,' that we should form an erroneous opinion from the present state of society of the effect of this offense, and the disorders it might introduce in former times; for religion was once so intimately blended with the government and laws, that to treat the received articles of faith or religious ceremonies with disrespect was in effect to attack civil institutions.

By the common law of England, as stated by Blackstone, blasphemy consists in denying the being and providence of God, contumelious reproaches of Jesus Christ, profane scoffing at Holy Scripture, etc., and is punishable by fine and imprisonment, or corporal punishment; the offense is also statutory, the statute 9 and 10 William III. cap. xxxii., declaring that if any one shall deny any of the persons of the Trinity to be God, or assert that there are more gods than one, or deny the truth of Christianity or of the Scriptures, he shall be incapable of holding any office; and for a second offense be

BLAST FURNACE

disabled from suing any action, or being an executer, and suffer three years' imprisonment.

By the law of Scotland, as it stood under acts of 1661 and 1695, the punishment of blasphemy was death. Blasphemy consisted of railing at or cursing God, or of obstinately persisting in denying the existence of the Supreme Being, or any of the persons of the Trinity.

The early legislation of the American colonies followed that of the mother country, and in some of them the crime of blasphemy was punished with death; but the penalty was mitigated before the establishment of independence, and imprisonment, whipping, setting on the pillory, having the tongue bored with a red-hot iron, etc., were substituted. Several penalties against blasphemy are to be found in the laws of some of the New England States, according to which it is provided that, if any person shall blaspheme, by denying, cursing, or contumeliously reproaching God, his creation, government, or final judging of the world, or by cursing or reproaching Jesus Christ or the Holy Ghost, or contumeliously reproaching the Word of God, consisting of the commonly received books of the Old and New Testament, he is liable to imprisonment for a term not exceeding five years. But the most direct and public violations of these laws are passed over without punishment or prosecution, due probably to the provisions of the National and State Constitutions, guaranteeing religious liberty, and the freedom of speech. In many States, the offense of blasphemy, not being a subject of special statutory provision, is only punishable either as an offense at common law, or a violation of the statute laws against profane swearing.

Blast Furnace, a modern mechanical appliance, or structure built of refractory material in which metallic ores are smelted in contact with fuel and flux, the combustion of the fuel being accelerated by air under pressure. The materials are fed in at the top of the furnace, and after the ores are reduced, the metal, or in some cases the matte, and the resulting slag are tapped in a molten state at or near the bottom; as a rule, the slags, being of less specific gravity than the metal, float upon it. The sizes of blast furnaces vary from a few feet to over 100 feet in height, a horizontal section through the structure showing either circular or rectangular interiors, the circular form being adopted for the larger sizes, while those of smaller height are often made rectangular to permit of introducing a number of tuyeres with air nozzles into a narrow hearth.

A vertical section of a modern American blast furnace shows at the lower part, the hearth or crucible of the shape desired, into which the air is admitted under pressure through tuyeres. On this hearth is superposed an inverted frustum of a cone forming the boshes, and above these the shaft of the furnace ascends in the form of a right cone. The shafts are inclosed by shells of sheet steel or by crinolines formed of bands and beams, and carried on columns. The boshes are usually secured by bands and the crucibles by sheet and metal jackets. The materials are charged into the shaft so that layers of fuel alternate with layers of ore and flux, the taper of the shaft being sufficient to permit of expansion as the materials are heated, and facilitate their delivery to the hopper formed by the boshes,

where reduction of the ores takes place. The reduced ore, meeting the burning fuel near the tuyeres, is melted, and the liquid slag and metal drop into the hearth or crucible (the cinder or slag floating on the liquid metal), from which they are tapped out from time to time. By heating the blast before it enters the tuyeres combustion is accelerated, and the furnaces produce increased quantities of metal with reduced fuel consumption per unit of product.

The large blast furnaces smelt ores of iron or manganese, or of iron and manganese, and are from 40 to 106 feet in height, a cross section at the top of the boshes showing a circle from 10 feet to 23 feet in diameter. The blast is heated to 1,000°, and sometimes to 1,200°, or 1,400° F., and is forced into the crucibles or hearth through from 6 to 20 tuyeres, at pressures from 5 to 15, and, at times, exceeding 20 pounds per square inch. The blast furnaces smelting silver or copper ores seldom exceed 30 feet in height, the horizontal section being rectangular, and the blast pressure but a fraction of a pound. A modern blast furnace will produce from 300 to 600 tons of pig iron daily, requiring from 1,000 to 2,000 tons of ore, fuel and flux to be fed into it. The cost for construction and equipment of one of these modern furnaces, with its necessary railroad tracks, storage room and bins for receiving the raw material, the mechanism for elevating it to the top of the stack, with sufficient blowing engines, boilers, hot blast stoves, etc., ranges from \$400,000 to \$800,000.

As a rule, blast furnaces smelting other ores than those of iron have the top of the furnace stack open, while, in those producing iron, the top is usually sealed by a bell closing against a hopper, to distribute the stock in the wide throat of the furnace and to control the gases which are the result of the smelting operation, so as to employ the calorific value of these gases for heating the blast or for generating steam in boilers to operate machinery. The practicability of using these gases in engines, where the gas, in exploding, gives impetus to a piston, has also been demonstrated. The blast is heated in hot blast stoves, generally cylinders from 14 to 25 feet in diameter and from 50 to 115 feet high, filled with checker work of fire brick. These stoves are placed in series; the gas being admitted to and burned in a stove raises the temperature of the masonry, after which the gas is shut off and the blast forced through the highly heated checkers. By alternating a series of stoves on gas or blast, at intervals of one or two hours, a nearly uniform temperature is maintained.

The blast, after passing through the hot blast stoves, is conveyed in iron or steel conduits, lined with fire brick, to tuyeres, set in the walls of the crucible. These tuyeres are formed of an inner and outer shell with closed ends, water circulating between the two shells. The tuyeres are mostly made of bronze or copper and are set in larger tuyere blocks (also water cooled) of iron or bronze. Nozzles connect the lined air conduits to the tuyeres. The cooling water required by a modern blast furnace amounts to millions of gallons daily. A large furnace requires a boiler equipment of from 3,000 to 3,500 horse power for its blowing, pumping and elevating machinery, electric plant, etc.

BLAST FURNACE PRACTICE

Blast furnaces are numerous in Great Britain, Germany, France, Belgium, Spain, Russia, Austria-Hungary, Sweden, and they also exist in Canada, Mexico, Italy, China, India, and Japan. Data as to the number of these is not at hand, but the pig iron production of various countries gives an approximate idea. In 1909 these figures (in metric tons) were approximately as follows: United States 26,000,000 tons; United Kingdom 10,000,000 tons; Germany 13,000,000 tons; France 3,700,000 tons (for the first six months of 1910, 1,700,000 tons); Russia 2,900,000 tons; Austria-Hungary 2,000,000 tons; Belgium 1,700,000 tons; Sweden 450,000 tons; Spain 400,000 tons; Canada 680,000 tons; Italy 200,000 tons; all other countries (estimated) 550,000 tons; making a total production of about 61,500,000 tons.

It is impossible to give the total number of blast furnaces in the United States, for the reason that the number of those used for producing copper, silver, etc., are not collated, but lists of the furnaces employed in reducing iron ores are carefully reported by the American Iron and Steel Association. There were in 1909, in the United States, approximately 450 blast furnaces, whose aggregate reported capacity amounted to over 25,000,000 long tons of pig iron, but as all of these furnaces are not active at one time (25 per cent often being idle), it is more equitable to consider the practical production as between that reported and the greatest annual output, which, in 1910, amounted to 24,338,302 long tons, valued at about \$400,000,000. See STEEL; IRON AND STEEL; FOUNDRY PRACTICE; BLAST FURNACE PRACTICE, MODERN, etc.

Blast Furnace Practice, Modern. The first requisite for the conduct of Blast Furnace Practice is equipment, and therefore although the space allotted for this article is very limited, a brief description of the apparatus required to obtain modern furnace practice is necessary.

The construction of the Duquesne Blast Furnaces in 1902 and 1903 marked a great advance in the evolution of the modern blast furnace, for the labor of filling the furnaces formerly done by hand was performed mechanically, and their size far exceeded any previously built. The capacity predicted of 600 tons per day and actually accomplished, was the most marked achievement, as it was fully 50 per cent greater than any furnace production at that time. These furnaces were 100 feet high and were equipped with powerful blowing engines of large capacity.

The ore was handled in and out of stock pile mechanically, by means of a large gantry crane equipped with a scraper bucket spanning the ore yard. The stock house was equipped with steel bins for ore, stone, and coke, and the furnaces were filled by an inclined hoist, operating a cylindrical bucket, which was deposited in the stock house on a low car and transferred to the bin chutes for filling.

This bucket was closed by a bell, to the rod of which the hoist rope was hooked when the tub was hoisted, and this bell when lowered on top discharged the contents automatically into the receiving hopper, thus forming a complete ring in layers of material in this hopper each time a tub was hoisted.

The success of these stacks was followed rapidly by the construction in different parts of the country of stacks of similar dimensions, but

differing somewhat in equipment, particularly in the charging mechanism. These furnaces for a while gave good results, but later were a grave disappointment, owing to the almost universal failure of their linings after a few months' operation, while the Duquesne furnaces made over one million tons on their first lining, a result which the writer believes to have been clearly shown since to be due entirely to the good distribution obtained by the mechanical charging apparatus installed at the Duquesne Works.

The hoist and distributing mechanism installed at Duquesne seemed to engineers, when built, more complicated and expensive than was necessary, and at the same time they aimed to make a still greater reduction in the labor employed, but they failed to appreciate the importance of good stock distribution on top of the furnace and how it was accomplished by the Duquesne design.

The usual construction now adopted for charging the furnace is mechanical stock handling, storage bins, and skip hoists equipped with single or double skips. These dumping skips are responsible for the short life of the furnace linings, for, in discharging their load on top of the furnace, they cause a sorting of the stock, the finer parts dropping down near the dumping point of the skip, and the lumps going farthest away. It was quite possible to obtain a uniform layer in the furnace of coke, limestone, and ore, but the fact that more of the lumps went to the side of the furnace farthest from the skip made the gases channel on that side and thus cut the inwall by concentrating the smelting action to that side of the furnace. Good stock distribution may be obtained by mechanically filled furnaces provided with any kind of skip hoists by the use of the rotary distributor, of which there are three distinct types.

From the bins, an electrically driven larry should weigh and deliver the stock to the skip at the foot of the inclined furnace hoist. Plants operating on lake ore must receive most of their yearly requirements during warm weather, and hence a stocking equipment is required, and even at all furnaces some form of stocking plant is desirable.

When the plant is located on navigable water and receives its ore that way, the unloading machines operating grab buckets are arranged to deliver the material into the stock piles, from whence it is recovered by another grab bucket, operated by a gantry crane spanning the ore yard, and delivering its load into an electrically driven transfer car serving the stock bins. When two or more large furnaces are located away from navigable water, and hence receiving all the stock by rail, a mechanical car dumper is an economy.

Considering next the power equipment, we find that the water tube boiler gives the best results with waste gas as a fuel, but for more than two furnaces, much greater economy is obtained by burning the gas direct in the cylinder of the gas engine, and thus furnishing the electric power required to drive auxiliary machinery about the plant, and in the gas driven blowing engine the blast required for the furnace. In plants where the water tube boiler is still in use, the steam engines are compounded and the exhaust steam condensed in a central condenser of large capacity.

BLAST FURNACE PRACTICE

Furnace gas is made much more efficient under boilers, if cleaned before use, and if going to internal combustion engines, a thorough cleaning is absolutely necessary.

For use under boilers, the cleaning may be effected by the wet dust catcher of the contact type, where the gas is repeatedly directed against a surface of water kept clean by circulation.

Such dust catchers remove 95 per cent of the solid matter in the gas, absorbing less than 1 per cent of moisture, and reducing the temperature about 5 per cent. For use in the gas engines, the gas must be thoroughly cooled and scrubbed to remove the solid matter very completely, for which a great variety of devices are used. It is good practice to pass all the gas through a good contact wet dust catcher and thus retain most of the initial heat for the gas to be burned in the stoves, subjecting the balance to a more thorough treatment for use in the gas engines.

No furnace plant to-day is complete without some means of regulating the amount of moisture admitted into the furnace in the blast, and the most satisfactory way to do this is to reduce the amount to the lowest possible minimum. This is accomplished by refrigeration of the air admitted to the air cylinders of the blowing engines, a process patented by James Gayley, and accomplishing greater economical results than was estimated possible in that direction.

Iron Ores.—Such ores are smelted when containing from 40 per cent and upwards, and, in case of calcareous ores, even lower grade material has been treated profitably, but the costs of manufacture increase very rapidly as the yield in metallic iron drops in the mixture. It is, therefore, important to give attention to the preparation of the ore before smelting, with the view of removing objectionable elements. This concentration frequently removes considerable phosphorus which is practically unaffected by the smelting process, and occasionally reduces the sulphur, which is always a difficult and expensive element to remove.

In concentration, it is usually necessary to crush fine, which leaves the product in a finely divided state, and, as the ore grains decrease in size below what would stay on a 60 mesh sieve, the difficulty of smelting increases; hence two methods are used to agglomerate this fine product and thus render it more easily and economically smelted.

One is, briquetting either with or without binder, in the latter case, it is necessary to burn the product in a continuous furnace. The other is nodulizing, that is, agglomerating by use of the rotary kiln. This latter process practically removes all the sulphur, that occasions any trouble in the smelting; breaking up sulphates, as well as sulphides. Ores carrying 6 per cent of sulphur, contain after such treatment, less than 3-10 of 1 per cent. Some ores, principally the soft brown hematites, found quite abundantly in the Southern states, are best concentrated by washing.

The point necessary to emphasize in discussing this subject is the importance of bringing the material for smelting into the blast furnace as pure as possible, consistent upon securing the proper slag volume for good working.

Fuels.—For the blast furnace, coke (q.v.) is

to-day the most commonly used, on account of the wide distribution of coking coals, but anthracite is still used largely by the plants within easy radius of the anthracite field of Pennsylvania and charcoal is still used, where timber is abundant.

The development of the retort oven, particularly with the saving of by-products, has made possible the coking of coal that is practically non-coking, in the ordinary beehive oven. At the same time, it has reduced the cost of coking from 40 cents to \$1.50 per ton of coke, depending upon the nature of the coal and the market value of the by-products at the ovens.

With fuel, as with ores, it is important to eliminate earthy impurities before the smelting operation. It is therefore found advantageous to wash coal, high in sulphur and ash, that is, such as will, in the raw state, give a coke over 1.25 per cent in sulphur and 15 per cent in ash.

By-product coke, however, lacks the silvery color of beehive coke, and is not quite as efficient in the blast furnace pound per pound of the carbon contents. It is also frequently high in moisture, due to faulty methods of quenching.

In order of efficiency in the blast furnace, charcoal comes first, next anthracite, beehive coke, retort coke.

Small furnaces operate with lower fuel consumption on anthracite than on coke and it is always necessary to lighten the burden when changing such furnaces from anthracite to coke fuel. Other things being equal, the fuel with high combined carbon is more efficient in the blast furnace than one of lower carbon content. For example, the best coke from the Pocahontas region is more efficient than the best Connellsville; the former, while a soft coke, has from 5 to 7 per cent of ash, while the latter, although hard and silvery, has from 10 to 12 per cent of ash.

Fluxes.—Purity is here a desideratum as well as in ores and fuels, but the only way it can be obtained is by choosing as pure a deposit as possible, then strip off the overlying earth carefully, and, in quarrying, throw out stratas or dykes of silicious material.

It is important that the flux for the furnace be crushed to conform with the average of the stock, which ordinarily means, broken to pass a three-inch ring.

Both Dolomite and Calcite are used as flux, the latter is a more active desulphurizing agent, but does not make as fluid a slag, and this lack of fluidity offsets to a large extent its greater affinity for sulphur. While the greater fusibility of dolomite slag increases the opportunities of calcium present to combine with the sulphur, and hence as a rule, one flux is as efficient as the other, as a purifying agent in the blast furnace process.

Throughout the South, dolomite is used when basic pig is desired and calcite when foundry iron is sought. In other words, dolomite is found to give low silicon and low sulphur, while calcite gives higher silicon in the pig.

Blast.—Each furnace should be equipped with blowing engines, capable of delivering the full quota of air at 30 lbs. pressure, if necessary, and provided with governors, to give a constant speed without regard to the pressure



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**MODERN BLAST FURNACE, SHOWING AUTOMATIC HOISTING AND CHARGING
EQUIPMENT**

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BLAST FURNACE PRACTICE

of the blast. This practice has been one important cause of the very large production obtained for American blast furnaces, and has been adopted by some of the English iron masters, after remodelling their plants.

The volume of the blast required for a modern stack is 85 cu.ft. per min. for each ton of pig made per 24 hours and weighs nearly $1\frac{1}{2}$ times all the solid materials charges into the furnace, hence any variations in the quantity or temperature of this blast, acts quickly upon the smelting process going on in the furnace.

In the desire to return as much heat as possible to the furnace, the use of the iron pipe stove, where the maximum temperature of the blast is limited to 950°F ., has been superseded by the firebrick stove, where the temperature is only limited by the refractory quality of the firebrick lining.

The iron pipe stoves have the advantage of maintaining a nearly constant temperature of the blast, so long as there is gas enough to fully supply the burners in the stove setting, but has the disadvantage of cooling off very rapidly, when blast is taken off the furnace for any purpose.

Firebrick stoves drop in temperature from 50° to 250°F . from the beginning to the end of an hour's blow, the usual period, but hold their heat when closed up tightly during a shut down of the furnace for a short period.

The best results with use of firebrick stoves is obtained by means of a good recording pyrometer to give the temperature of the blast going into the furnace and by introducing cold air through a tempering pipe, so as to hold the mixture of cold and hot blast at the temperature desired.

It is a good practice to maintain the temperature of the stoves two hundred degrees (200°) hotter than the blast going into the furnace, as a reserve to be called upon, should the furnace turn cold. With blast at constant volume and temperature, there is still another variable, which needs controlling, and that is the humidity of this blast.

The humidity of the atmosphere may vary from 9 grains in the summer to as low as 1 grain in the winter, and between these extremes, the humidity varies widely and rapidly during even a few hours of any day. Just the importance of this variable to furnace operation was never demonstrated until Mr. James Gayley constructed at the Isabella furnaces in the year 1904 his desiccating apparatus to furnish dry air for that plant. This trial showed that with blast at less than 2 grains of moisture per cubic foot, a saving of 20 per cent of the fuel required per ton of coke was effected, while theoretically only 3.7-10 per cent was expected. Since these astounding results, many efforts have been made by prominent metallurgists to explain the discrepancy between the actual and theoretical saving, current metallurgical literature contains much of interest on this subject.

Gas.—The waste gases issuing from the furnace consist principally of nitrogen, carbonic oxide (CO), carbonic acid (CO_2) and water in the form of steam.

The ratio CO and CO_2 indicates the character of the combustion taking place in the furnace hearth, the larger the percentage of CO_2 , the better the combustion and the lower the

fuel consumption. A good average ratio for the United States is CO_2 and CO , that is (2 to 1). In rare instances it has been as low as $1\frac{1}{2}$ to 1, but with a hot furnace making foundry or high silicon pig, it may reach 4 to 1, or in speigle manufacture, from 10 to 15 to 1, depending on the mixture being smelted.

To obtain the maximum economy in iron smelting, every effort is made to utilize the heat units escaping in the waste gases. This is accomplished in two ways. One portion is used in heating the blast, as already described, and the remainder is burned for power, either under water tube boilers, for the generation of steam, or in the cylinder of gas engines, about 65 per cent of the total waste gas produced being usually available for this purpose, and the balance 35 per cent going into the stoves for heating the blast.

The modern furnace is a large producer of power in excess of its own requirements, especially when the gas is utilized in gas driven engines. Such engines may furnish the blast required, and electrical energy for distribution about the furnaces, providing also an excess for sale or distribution elsewhere, amounting to 800 H.P. per ton of pig per hour.

Cinder or Slag.—This by-product in the manufacture of pig iron is a silicate of the oxides of the metals not reduced in the process. Various attempts have been made to utilize this material, and it is quite extensively used for road making and for railroad ballast. For this purpose it is frequently run when hot onto an endless chain of cast iron pans, and discharged broken and chilled, in cars for distribution. This method has the advantage of making the surface of the slag vitreous, and thus impervious to water.

The most remunerative use for furnace slag of certain composition is in the manufacture of slag cement. For this purpose the slag must not be over 4 per cent in magnesia and from 12 to 14 per cent in alumina. Two kinds of slag cement are manufactured, the ordinary Puzzolani, made direct from the slag without reburning, and slag Portland cement, made by clinking the slag in a rotary kiln and then grinding. When slag is intended for cement purposes it is granulated, that is, run while hot into water, which breaks it up in the form of sand. Such material is also useful to replace sand in making concrete.

Granulated cinder is light or heavy, depending upon the amount of water used in quenching. In the first case, it seems to consist of small globules of chilled cinder, in the latter, it resembles sand.

The quantity of slag made per ton of pig produced varies from 600 lbs. per gross ton of pig to 3,000 lbs. and over. The slag has an important bearing on the quality of the pig made, and is one of the great purifying agents of the blast furnace. The greater part of the furnace slag produced, however, is unutilized, and is usually tapped into iron cars called ladles and hauled in the fluid state to the bank, where it is poured out.

Iron Product.—This metal is a crude carbide of iron, containing about 94 per cent of metallic iron, from 3.25 per cent to 3.75 per cent of carbon and graphite, silicon varying usually from $\frac{1}{2}$ per cent to 4 per cent, and sulphur usually

BLASTING

from .01 per cent to .10 per cent, while the phosphorus in Bessemer pig is less than .10 per cent and in low phosphorus pig down to .03 per cent, and in basic from .10 per cent to 3 or 4 per cent, depending on the ores used. In the manufacture of pig iron, it is possible to vary the percentage of carbon somewhat and the proportions of carbon to graphite.

It is also possible to control the sulphur, and the silicon, but the phosphorus must be controlled solely by the choice of the materials charged. This choice also influences the formation of other elements under discussion, but in case of phosphorus, it is the *only* means for effecting such control or regulation.

Practically all of the phosphorus contained in the fuel flux and ore passes into the product, except a loss when making high silicon foundry iron of about 7 per cent by volatilization, and this loss may be increased to 10 per cent in the manufacture of speigle.

The usual way of handling the pig product is to run the metal while hot into moulds made in sand, forming a runner called a sow and short branches about three feet long, called pigs.

In case of gray iron, this metal is broken hot, when it has first solidified, and then cooled with water and loaded into cars. This iron has considerable sand adhering to the surface of the pigs, and for that reason is unsuited to melt in the open hearth furnace, where the lining is made of basic material. In order to obtain iron free from sand, and to reduce the arduous work of breaking this product hot, and carrying same by hand into cars for shipment, various devices have been constructed.

The Uehling pig machine is the most common device employed to make sandless pig. It consists of an endless chain of moulds, which are filled at one point and after spraying with water, discharge the pig into a transverse pan conveyer, which carries the pig under water, where it is thoroughly cooled and afterwards is delivered into cars for shipment.

Another form is provided with moulds and pans made of soft flange steel, and these when filled, pass into a tan where they are submerged, the metal cooled, and then delivered into cars. Still another form consists of a substantial turntable on which the moulds are mounted.

When it is not necessary to obtain sandless pig, the mechanical pig breaker is used. In the operation of this device the metal is cast in sand and the whole bed is removed mechanically by a travelling crane or trolley to the breaker, where the pigs are broken and fall into cars.

With the pig machines the metal must be first run into cars or ladles, from which it is poured into the machine, but with the pig breaker no ladles are required, the metal going direct into sand beds, as when it is to be handled by hand. Sandless pig may also be obtained by equipping the cast house with cast iron moulds or "chills," which are washed with loam while hot, thus making it easy to lift the pig when it is cooled.

Pig iron before the advent of the pig machine, and even since for some purposes, is graded according to fracture as follows:

No. 1, No. 2, No. 3 forge, mottled and white,

the first No. 1 and No. 2 being made in a hot furnace and white in a cold furnace. No. 1 is called the highest grade and contains, as a rule, the lowest sulphur, and the highest percentage of graphitic carbon; white is called the lowest grade and is usually high in sulphur, low in graphite and high in combined carbon. These grades are practically obliterated in machine cast pig, and the iron is usually sold by analysis. This method of classifying also obtains at large steel plants, where most of the pig is taken direct, that is, in the fluid state, to the Bessemer or Open Hearth for treatment.

Blast Furnace Lines.—In the blast furnace the hearth represents the grate surface, and its area determines the amount of fuel burned per unit of time, hence, the production of the furnace. The top of the furnace controls the distribution of the charged materials, and has an important bearing on the working of the furnace, the character of the combustion taking place in the hearth, and hence the burden or amount of charge the coke unit is capable of carrying in smelting.

The bosh determines to a large extent, depending upon its height and angle of slope, the regularity of the working of the furnace, by assisting or retarding the descent of the charge in the smelting zone.

The largest furnaces in the United States at this writing are built with the hearth and top diameters practically equal, 15'-6" to 16'-0", while the diameter of the bosh is usually 25 per cent greater and the angle of the slope approximately 74°.

The tendency of the last five years has been to increase the hearth and top diameters, while the bosh has remained about the same in diameter, but lower in height. These changes seem to cause the stacks to work with greater regularity, and larger outputs on burdens composed, largely, of fine ore, and, at the same time, the loss of ore in flue dust has been materially reduced.

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Blasting, the technical term for splitting and breaking up any object by means of gunpowder or some of the other powerful explosives now in use. The operation, which is of extensive use in quarrying, mining, and other branches of engineering, is often performed by boring a hole in the substance to be exploded, by means of an iron rod, called a jumper, filling it with gunpowder, and igniting this by means of a match, burning so slowly as to allow the parties employed to remove to a sufficient distance before the explosion takes place. At one time it was supposed that the force of the explosion depended on the firm packing of the gunpowder in the hole by means of small chips of stone, sand, etc. It has since been ascertained that loose sand is as effectual as firm packing, which in consequence has been generally laid aside. One of the most important modern improvements in blasting is the firing of the charge by electricity. This mode is more especially applicable to submarine blasting, and was first practised for that purpose by Gen. Pasley, in 1830. The only thing necessary is to make an interruption in the conducting wire at the point where the explosion is to take place. In passing the electric current,

BLASTOMERYX—BLAUBOK

a spark produced at the interruption fires the charge. The effect being instantaneous the operator can fire any number of charges simultaneously. Gun-cotton is often employed in blasting, and nitro-glycerine has also been found to be a very powerful agent in such operations, but its use requires the utmost caution, as it is very liable to explode unexpectedly with most disastrous results. The same objection does not apply to dynamite, which is quite as effective and perfectly harmless when properly handled. For removing small volumes of rock in mines, quarries, and other engineering enterprises at a single blast, small-shot blasting is the most common method employed. This consists of drilling a small number of holes in the rock from $1\frac{1}{4}$ to 3 inches in diameter and from 18 inches to several feet in depth which are then filled with dynamite or blasting-powder or some other safe and easily handled explosive, and properly connected by fuse or with a magnetomachine or electric battery by electric wires. The space above the explosive is then plugged up with sand, dirt, clay, or other matter, and the charge exploded. For breaking the rock into small pieces so as to be more easily removed (as in excavating for a foundation) the holes are drilled close together and heavily charged, but where it is unnecessary to break into small pieces (as in quarrying) and large shapely masses are more desirable the holes are drilled in rows with greater distance between and filled with a smaller amount of explosive. This will split the rock practically along one line and will not shatter it as in the first case. In excavating tunnels, it is in many cases desirable to remove a mass of rock the size of the tunnel cross-section, an object which is generally accomplished by drilling and firing a small number of converging holes, thus forming and removing a cone-shaped or wedge-shaped centre-core. This central opening thus formed is enlarged by drilling and blasting successive rings of holes around it.

For removing vast quantities of rock or blowing up ledges, the best method is mine blasting. For this purpose shafts are sunk either vertically, or horizontally, or both, into the ledge to be removed; enormous quantities of powder, dynamite, or other explosives are placed at the bottom or end of the shafts, which are then closed up by rocks, earth, etc., and the charge is fired either by fuse or by electricity, most generally the latter.

One of the greatest mine blasting operations ever attempted was the removal of the reefs in the East River, near New York, known as Hell Gate. An entrance shaft was sunk on the Long Island shore, from which the reef projected. From this shaft nearly 20 tunnels were bored in all directions, extending from 200 to 240 feet, and connected by lateral galleries. Upward of 52,000 pounds of dynamite, rend rock, and powder were used, and millions of tons of rock were dislodged. In May 1894 a vertical cliff, Greben Point, was blown up in order to remove a rock obstruction in the Danube River, known as the "Iron Gates"; in 1889 the face of a quarry at South Bethlehem, N. Y., was broken down by a mine blast and in 1886 the same operation was carried out at Craræ Quarry in Argyllshire, Scotland; and on 18 Dec. 1899 a granite mound,

known as Vesuvius Butte, was blown up in order to secure a sufficient quantity of rock to build a dam near Teller, Colorado. Surface blasting is generally used to remove reefs and obstructions to navigation, high explosives such as dynamite, gun-cotton, or nitro-glycerine being the only effective agencies in an unconfined space, as the detonation is so sudden that the shock is instantly transmitted to the rock with which it is in contact. Numerous important improvements have been made in blasting by the substitution of rock boring machines for hand labor. Of such machines, in which the jumper or drill is repeatedly driven against the rock by compressed air or steam, being also made to rotate slightly at each blow, there are many varieties. See also EXPLOSIVES.

Blastomeryx. See MERYCODUS.

Blatchford, Samuel, jurist: b. New York, 9 March 1820; d. Newport, R. I., 7 July 1893. He graduated at Columbia, 1837; became secretary to Gov. W. H. Seward of New York, and practised law at Auburn, N. Y., as a member of the governor's firm, 1845-54. In 1854 he settled in New York as head of the firm of Blatchford, Seward & Griswold. Though he attained success in general practice, it was his application to admiralty law that gave him his widest repute. On 3 May 1867 he was appointed judge of the United States district court for the Southern district of New York; in March 1878, judge of the United States circuit for the second circuit; and in March 1882 he became an associate justice of the United States supreme court. Here he continued to give close attention to admiralty cases, and also rendered important decisions on bankruptcy, copyright, patent, and libel cases. Publications: 'Reports of Cases in Prize in the Circuit and District Courts for the Southern District of New York 1861-5' (1866); 'Reports of Cases in the Circuit Court of the United States, Volumes 4-6' (1867-9); 'Circuit Court Reports for the Second Circuit, 1847-75' (12 vols. octavo); 'Reports of the Circuit Courts of the United States, Second Circuit, Volumes 13-20' (N. Y. 1877-83, 8 vols.); with E. Howland and E. R. Olcott, 'United States District Court Reports (Admiralty Cases Decided by Judge Betts) for the Southern District of New York, 1827-47' (N. Y., 2 vols. octavo).

Blatchley, Willis Stanley, naturalist: b. Madison, Conn., 6 Oct. 1859. He graduated at Indiana State University 1887, and was successively an assistant on the Arkansas Geological Survey 1889-90, a member of Scoville's scientific expedition to Mexico 1891, and assistant on the United States Fish Commission in 1893. In 1894 he was elected State geologist of Indiana, and re-elected 1898 and 1902. Besides his annual reports his scientific writings include: 'Gleanings from Nature' (1899); 'Locustidæ and Blattidæ of Indiana' (1892); 'Some Indiana Acrididæ' (1891-8); 'Descriptions of New Species of Orthoptera'; 'A Nature Woeing' (1902); etc.

Blat'idæ. See COCKROACH.

Blaubok, blow'bök, a large antelope of South Africa. (*Hippotragus niger*). It is of a

BLAUVELT — BLEACHING

bluish hue, and has long, stout horns which sweep back from its forehead like those of its relatives, the isabel and equine antelopes. It formerly occurred in large herds, but had a limited habitat, and is now probably extinct.

Blauvelt, blow'vêlt, **Mme. Lillian Evans** (Mrs. Wm. F. PENDLETON), prima donna: b. Brooklyn, N. Y., about 1870, of Welsh and Dutch ancestry. When eight years old she made her début as a violinist. She studied (voice) with M. Jacque Bouhy, of Paris, for three years. Her début in opera was made at the Theatre de la Marmari, Brussels, and she has taken the principal roles in 'Faust,' 'Romeo and Juliet,' 'Myna,' etc. Of late her work has been chiefly in concert and oratorio. Besides Great Britain, Canada, and the United States, she has sung in Russia, Germany, France, Italy, Holland, Belgium, Austria-Hungary, and Switzerland.

Blavatsky, bla-vâts'ke, **Helene Petrovna**, Russian theosophist: b. Yekaterinoslay, Russia, 1831; d. London, 8 May 1891. She traveled in all parts of the world and succeeded in entering Tibet. In 1873 she came to the United States, founded the Theosophical Society in New York, and aided in establishing 'The Theosophist.' She studied the East Indian esoteric doctrines and Buddhist philosophy, and by her writings contributed to make this philosophy popular. She wrote 'Isis Unveiled'; 'The Secret Doctrine'; 'Key to Theosophy.' See THEOSOPHY.

Blazing Star. Various hardy perennial plants. See LIATRIS.

Blazonry, the art of describing a coat of arms in such a way that an accurate drawing may be made from the verbal statements given. To do this a knowledge of the points of the shield is particularly necessary. Mention should be made of the tincture or tinctures of the field; of the charges which are laid immediately upon it, with their forms and tinctures; which is the principal ordinary, or, if there is none, then which covers the fess point; the charges on each side of the principal one; the charges on the central one, the *bordure*—with its charges; the canton and chief, with all charges on them; and, finally, the differences or marks of the cadency and the baronet's badge.

Bleaching (Fr. *blanchiment*, 'whitening'), the process of removing the coloring matters from fabrics of cotton, linen, wool, silk, etc., or from the raw materials, and also from straw, wax, and other substances, and leaving them perfectly white. Steeping cloths in lyes extracted from the ashes of plants, appears to have been practised by the ancient Egyptians for this purpose. In modern times the Dutch have almost monopolized the business, at least till within about 100 years. Previous to this time the brown linens manufactured in Scotland were regularly sent to Holland to be bleached. A whole summer was required for the operation; but if the cloths were sent in the fall of the year, they were not returned for 12 months. It was this practice which caused the name of Hollands to be given to these linens. The Scotch introduced the business of bleaching for themselves about the year 1749; but it was long believed that the peculiar properties of the water about the bleaching grounds of Haarlem gave to this neighborhood advantages which no other region could possess. The use of chlorine as a bleaching agent was first proposed by Ber-

thollet in 1785, and shortly afterward introduced into Great Britain, where it was first used simply dissolved in water, afterward dissolved in alkali, and then in the form of bleaching powder, commonly called chloride of lime, the manufacture of which was suggested by Mr. Tennant, of St. Rollox, Glasgow, in 1798. At first he passed the chlorine into milk of lime, and thus obtained the solution known as bleach liquor. In 1799 he took out a patent for absorbing chlorine by dry lime, and thus obtained bleaching powder. Bleaching powder has little bleaching action till the chlorine is liberated by the action of an acid. The best bleaching powder contains about 36 per cent of available chlorine; that is, chlorine which is liberated by acid.

In Silesia and Bohemia, where the chlorine process is not adopted, the linens are exposed to a fermenting process, then washed, and steeped in alkaline liquors, with alternate exposures upon grass, which processes are repeated a great number of times for 60 to 70 days; but to render them properly white, they are afterward passed through a bath acidulated with sulphuric acid, then treated again with the potash lye several times and alternately exposed on the grass, and finally thoroughly cleansed by washing in a revolving cylinder called a dash-wheel. This machine is also employed in the English and Scotch processes for washing the goods without subjecting them to unnecessary wear. The frequent repetition of the different processes is rendered necessary by the complete diffusion of the coloring matters through the flax fibres, and their close union with them; each operation decomposing and removing in succession small portions only.

In the bleaching of cotton cloth, the pieces, after being singed, by passing them over a red-hot plate or a semi-cylinder of iron or copper, are steeped in lukewarm water or old lyes, till they are completely soaked, which loosens any paste or filth got during weaving; they are then well washed through the dash-wheel, and put through the hydro-extractor or drying machine. If the cotton is in the hank, this process of steeping and washing is not required.

The mechanical operations of the bleaching house vary considerably, according to the quality of the goods and the facility for mechanical appliances. In the chemical operations of whitening the cloth there is little variation, further than that heavy fabrics require longer time and more frequent repetition of the processes. The first operation, after steeping and washing, is boiling. The boiling liquor is made by adding a quantity of water to slaked lime, and when the grosser particles of lime have settled to the bottom of the vessel, the milky liquor is put into the boiler, or, it may be, filtered through a cloth. Some bleachers use with the lime a little carbonate of soda; the quantity of lime varies from four pounds to eight pounds for every 100 pounds of cotton, and from one pound to two pounds of soda ash, where this is used. The boilers used for boiling the goods are called *kiers*, and many kinds are used, the boiling liquid being made to shower over the goods and percolate down through them. This is effected by having a false bottom or frame fitted inside the boiler at about one third of its depth from the bottom, upon which the goods are laid. The space between the false bottom

BLEACHING

and real bottom of the boiler is filled with the liquor or lye, connected with which is a pipe leading to the top of the boiler. When the heat is applied, either by steam or fire, and the liquor begins to boil, it is forced up through this pipe, which is made to shower its contents over the surface of the goods. This boiling is continued, according to the quality of the goods, from 6 to 12 hours. The goods are now removed from the boiler and washed in water; they are then passed through dilute hydrochloric acid, again washed, and boiled for 12 hours with dilute caustic soda, after which they are passed into a solution of bleaching powder contained in a large stone or wooden trough or cistern, where they are left for from two to four hours. The bleaching solution is prepared by first dissolving a quantity of bleaching powder in water in a large cask and allowing the whole to settle; a quantity of the clear liquor is then drawn from the cask and put into the large bleaching cisterns, which have been previously nearly filled with water. To ascertain the necessary quantity of this strong bleaching liquor to be added to the troughs or cisterns, a certain measure of sulphate of indigo is taken in a graduated vessel, termed a test glass, and then, according to the number of graduated measures of the bleaching solution required to decolor the sulphate of indigo, the strength of the bleaching liquor is regulated. These test glasses and sulphate of indigo are carefully prepared for the purpose.

Instead of dash wheels, a more improved method of cleaning and washing is adopted by some bleachers previous to boiling the goods. They are all sewed together, end to end, making one line of the whole. This line of pieces is drawn along by machinery between rollers and squeezers, with a plentiful supply of water, and having been thus thoroughly washed and cleaned, is at last laid out by a mechanical contrivance into the bleaching trough. The goods are allowed to steep in the bleaching liquor from two to four hours; they are then lifted and washed, either by the dash wheel or rollers, as before, and are then laid in a sour, made by adding about one pint of hydrochloric or sulphuric acid to every four gallons of water. After steeping in the sour for four hours, the goods are again washed, as before, and are subjected to another boiling for eight hours; but this time the lye is caustic soda or potash, generally the former, made caustic by boiling together a quantity of soda ash and slaked lime, and allowing the sediment to settle, and using only the clear solution. About eight pounds of soda ash suffice for 100 pounds of goods. After the boiling the goods are again washed and steeped in the bleaching liquor for eight hours, and again washed and soured—the sour in this case being always made with sulphuric acid. Light fabrics require no further treatment; but heavy fabrics need a clearing process, which is a repetition of the last course, the liquors being generally, however, a little weaker, and the processes shorter. Cotton, in the hank, undergoes the same operation, except in the washings, which are performed by hand, not with the wheel. The goods being bleached and dried by the extractor, are now prepared for the operations of finishing. For this purpose they are stretched by women to their breadth, and the folds, as much as possible, taken out by beating them; then they are stitched together by the

ends with a sailor's needle, and being thus prepared for the mangle the cloth is now starched, common wheat flour and a portion of porcelain clay being employed. It is then subjected to the action of the stiffening machine, and having been thus impregnated with starch, the superfluous portion of which is pressed out as it passes through the rollers above, the goods are then hung upon rails in an apartment, called the stove, heated by two furnaces from which flues are led through the room. The heat thus generated is sometimes so great that the workmen, in hanging up the cloth, are obliged to throw off most of their clothes. When the goods are dried thoroughly, they are taken from the stove and carried to the damping machine, where they are subjected to the action of a shower of water. When the cloth comes from the damping machine, it may be seen covered with wet spots, the greater portion, however, being dry; but after remaining some time it becomes uniformly damp. The goods are now passed through the calender; they are then regularly folded and put into a Bramah press, with a sheet of pasteboard between each, and, being sufficiently pressed, they are then finished for the market. The process has been greatly shortened by the introduction of the Mather-Thompson process (1884). In this process an important feature is the use of the steamer kier, in which the goods are submitted to the action of low-pressure steam. The material is passed through soda lye, squeezed, and washed; then through boiling caustic soda, squeezed, and run into a steamer kier, where it is boiled for four hours under a pressure of four pounds, washed with hot water, and then passed continuously through a series of vats containing water, bleaching powder solution, carbonic acid gas, water, alkaline solution, water, bleaching powder, carbonic acid gas, water, hydrochloric acid.

The bleaching of linen is conducted after a similar manner to that of cotton; but there is much more coloring matter in the former than in the latter, and it is therefore found necessary in the bleaching of linen to repeat the boiling in lye and the steeping in chloride of lime three or four times. An electrolytic method of bleaching (the Hermite process) has recently been introduced. The chlorine for bleaching is liberated by the action of an electric current on solutions of calcium or magnesium chloride. Wool and silk cannot be bleached with chlorine, so sulphur dioxide, usually prepared by burning sulphur, is used instead. In the case of wool, the material is well washed with water and scoured with alkaline solutions to remove fatty matters. It is then exposed, while still wet, to the action of sulphur dioxide in a brick chamber for six or eight hours,—or it may be soaked for several hours in a solution of sulphurous acid,—after which it is well washed. Silk is treated with dilute acid, then worked in a soap bath for about 20 minutes to remove the gummy matter present, after which it is rinsed, tied up in bags of cotton, and boiled for from one to three hours in water, and rinsed in dilute alkali and finally in water. The bleaching is effected by stoving in sulphur dioxide, exactly as in the case of wool. In place of sulphur dioxide, hydrogen peroxide is coming into use for both wool and silk bleaching.

BLEACHING POWDER—BLEEDING

Bleaching Powder, a compound of lime, chlorine, and oxygen, greatly used for bleaching purposes, and as a disinfectant. It is commonly known also as "chloride of lime," a name somewhat unfortunately chosen, since it appears to imply that the substance is simple chloride of the element calcium, which is far from being the case. Its precise chemical nature has never been satisfactorily demonstrated, but it is believed to consist essentially of a mixture of calcium chloride and calcium hypochlorite. In preparing bleaching powder on a commercial scale, slaked lime is spread out, in a thin layer, on the floor of a chamber constructed of stone, or lined with lead. Chlorine gas is then admitted to the chamber, and allowed to act upon the lime until the latter has absorbed considerable of it, and has been superficially transformed into the substance desired. The lime on the floor is then thoroughly raked over, so as to expose a fresh surface to the chlorine, and the process is continued until samples of the powder, withdrawn for the purpose of analysis, are found to contain about 37 per cent of available chlorine. The lime used in the process should be as free from magnesia as possible, as otherwise more or less of the chlorine is wasted by the formation of undesirable compounds of chlorine and magnesium. The chlorine used in the manufacture of bleaching powder has been largely produced, in the past by heating manganese dioxid with the hydrochloric acid obtained as a by-product in the manufacture of soda from common salt. The tendency in recent times, however, has been toward the more direct manufacture of soda by the electrolysis of a solution of salt in water. Free chlorine gas is given off at the anode during this electrolytic process, and this is now largely utilized for the manufacture of bleaching powder; bleaching powder and soda being both produced in the same factory. Large works embodying this idea are in operation at Niagara Falls, and most of the soda and bleaching powders manufactured in the United States now come from that place. Bleaching powder is white, or nearly so, and has a strong smell of chlorine. Its disinfecting properties are supposed to be due to the slow liberation of that gas, which is a powerful germicide.

Bleak, or Blick (*Leuciscus alburnus*), a small river fish, six or seven inches long, of the carp family. It somewhat resembles the dace. Its back is greenish, otherwise it is of a silvery color, and its silvery scales are used in the manufacture of artificial pearls. It is a good food fish.

Bleak House, a novel by Charles Dickens (1853). Its secondary theme is the monstrous injustice and even ruin often wrought by delays in the old Court of Chancery, which defeated all the purposes of a court of justice.

Blechen, Karl Eduard, kārĭl ẽd'oo-ard bhẽh'ẽn, German landscape artist: b. Kottbus, 1798; d. 1840. After studying art in Italy for some years he settled in Berlin in 1830 and became professor at the Academy of Fine Arts there in 1835. The first representative of the Berlin landscape school, he painted 'Villa Este'; 'Villa Borghese'; 'View Near Nami'; 'View of Naples'; 'View at Tivoli'; etc.

Bled'soe, Albert Taylor, American clergyman and writer: b. Frankfort, Ky., 9 Nov. 1809; d. Alexandria, Va., 1 Dec. 1877. He was assistant secretary of war of the Southern Confederacy, and successively an Episcopal and a Methodist minister. He was also professor of mathematics at Kenyon College and at Miami University, 1833-6. Besides editing the 'Southern Review' and contributing frequently to leading literary, scientific, and theological periodicals, he wrote 'Examination of Edwards on the Will' (1845); 'Theodicy' (new ed. 1853); 'Philosophy of Mathematics' (1868); etc.

Bleeker, Ann Eliza, American poet, daughter of Brandt Schuyler: b. New York, Oct. 1752; d. Tomhanick, near Albany, N. Y., 23 Nov. 1783. She married, in 1769, John J. Bleeker, and moved to Tomhanick, whence she was driven by the news of the approach of Burgoyne's army. Her husband had already left to provide means of escape, when she was obliged to fly on foot, in the midst of her family, and of a crowd of other helpless persons, for refuge from the advancing savages. After enduring great horrors and distresses, they made their escape to Albany, and thence by water to Red Hook, where they remained until the surrender of Burgoyne enabled them to return to their home. Her poems were written as suggested by occasions, without a view to publication. She possessed a sportive fancy, with much tenderness of feeling, but the sad experiences of her life produced upon her such an effect, that she destroyed "all the pieces that were not as melancholy as herself." Her poems are to be found in the earlier numbers of the 'New York Magazine,' and a collection of her stories and "poetics" in a volume published in 1793, by her daughter Margaretta.

Bleeding, the escape of blood from the arteries or veins. Bleeding may be external, and thus readily seen and prevented by proper surgical measures, or it may take place internally, into one of the large body cavities, and is then a serious matter. The amount of blood that is in the human body varies from one tenth to one twelfth of the weight of the individual, and of this from 40 to 60 per cent may be lost without resulting in death from the direct effects of bleeding. Death may result in some individuals from the loss of much smaller quantities, but most persons can lose two fifths of their blood and not die. Bleeding varies widely in its rapidity. Some wounds ooze, others well-up, and again bleeding may be very rapid when a large vessel has been cut.

Bleeding from a vein or an artery may be recognized by the dark color and regular flow from the former, and the brighter red and spurting or throbbing flow from the latter. If bleeding is taking place while pressure is being applied to a cut these differences may not be so pronounced. In emergencies bleeding from an artery may be stopped by direct and hard pressure of the carefully cleaned finger immediately over the source of the issuing jet of blood. This pressure must be hard and continued. This will permit time to find the chief artery that is supplying the bleeding vessel, and as soon as this is found pressure upon it will further aid in suppressing the flow. Thus the brachial artery can be found on the inside of the arm by feeling on the patient's well side, and firm pres-

BLEEDING HEART YARD—BLENDE

sure on it will stop all bleeding in the parts below, as in a cut wrist or cut hand. Pressure on the femoral artery in the groin will control all bleeding below the point of pressure. As pressure by means of the finger is difficult to maintain, an improvised apparatus may be made of a knotted napkin or large handkerchief. This may be placed about the arm or leg, the knot brought to press on the artery and then by means of a short stick the whole may be made to tightly compress the entire limb. (See **TOURNIQUET**). Pressure of this kind should not be too prolonged, or serious damage to the parts may result. Venous bleeding is usually controlled by direct pressure of the limb on the side away from the heart and by direct pressure of antiseptic gauze. In oozing, direct pressure of antiseptic gauze or direct application of hot water, 118-120° F., is most effective. Powders, cobwebs, iron, alum, etc., are not advisedly used.

Internal hemorrhage is extremely important, since the blood cannot be seen, and one has to rely on the symptoms solely. These are usually a beginning sense of faintness or weakness, and perhaps some nausea. The extremities commence to get cold and white, the face becomes pale and anxious, and the patient may commence to have air-hunger. He desires the windows to be opened wide, thinking thereby to get more air. Thus the beginning symptoms are very similar to those of a severe fainting spell. But as the bleeding continues there is increasing restlessness with increased air-hunger; there may be cold, clammy sweat over the patient's body; there is sighing to gasping respiration, and the heart-beat is hard to hear and it may be impossible to feel the pulse beat. The patient may die in convulsions, the face becoming deeply cyanosed, and the respirations spasmodic or convulsive in type. If the patient does not die he will have a long, tedious convalescence. Prompt medical or surgical aid is imperative in all such cases. The best temporary stimulant is an enema of hot (118-120° F.) salt solution, one teaspoonful to the pint, which is allowed to run in and out of the rectum, a quart or two at a time.

Bloodletting.—This procedure was one much in vogue in former years, and while still a most desirable operation to perform for certain types of disease, the conditions brought about by its use are now largely induced by other means. In conditions of poisoning, some cases of pneumonia, and in some apoplexies, bleeding is still performed by competent medical practitioners, and is advocated in most manuals of practice. It is its indiscriminate use for all ills that has fallen out of favor.

Bleeders.—Certain individuals have a tendency to bleed inordinately from even the slightest wound. They are called "bleeders," and are frequently found in families, most of the members of which have like traits. The pulling of a tooth is often followed by continuous hemorrhage. The causes for this idiosyncrasy are not all known. In some an insufficient quantity of calcium salts in the blood has been thought to be the most important cause.

Bleeding Heart. See **DICENTRA**.

Bleeding Heart Yard, a squalid locality in London, mentioned by Dickens in 'Little Dorrit.' The origin of the name is unknown.

Bleek, Friedrich, frēd'rīx blāk, German biblical scholar and critic: b. Arensbök, Holstein, 4 July 1793; d. 27 Feb. 1859. He was appointed professor of theology at Bonn, 1829, and spent the remainder of his life there. He was the author of much esteemed commentaries and expository books, valuable Introductions to the Old and New Testaments (1860-2), his most important work being one on the 'Epistle to the Hebrews' (1828-40).

Bleek, Wilhelm Heinrich Immanuel, vīl'hēlm hīn'rīx īm-mān'oo-ēl, German philologist, son of Friedrich Bleek (q.v.): b. Berlin, 8 March 1827; d. Cape Town, 17 Aug. 1875. In 1855 he went to South Africa and devoted himself to the study of the language, manners, and customs of the natives. In 1860 he was appointed public librarian at Cape Town, and his researches were rewarded with a pension from the civil list. He was principal author of the 'Handbook of African, Australian, and Polynesian Philology' (1858-63), his other chief productions being 'Vocabulary of the Mozambique Languages' (1856); 'Comparative Grammar of South African Languages' (1862); 'Hottentot Fables and Tales' (1864); and 'The Origin of Language' (1868).

Bleibtreu, Georg, gā-ōrn blīp'troi, German artist: b. Xanten, Rhenish Russia, 27 March 1828; d. Berlin, 16 Oct. 1892. His first important picture was the 'Destruction of the Kiel Turner-Corps at Flensburg' (1852) and his subsequent works are also battle pieces. Among them are 'Episode from the Battle of Waterloo' (1858); 'Battle of Königgratz'; 'Surrender of Napoleon after Sedan'; 'Attack of Saxon Corps at Saint Privat' (1880).

Bleibtreu, Karl August, kārł ow'goost blīp'troi, German poet and novelist: b. Berlin, 13 Jan. 1859. He is one of the foremost representatives of the youngest German school in literature, and a pronounced realist. All his views are radical, as shown by the very titles of his works; for example, 'Revolution in Literature' (1885); 'Literature's Struggle for Life.' He also wrote 'Dies Iræ'; 'Napoleon at Leipzig'; 'Cromwell at Marston Moor.' His dramas are: 'Lord Byron' (1888); 'The Day of Judgment'; 'The Queen's Necklace'; etc.

Bleichröder's, blīh'rē-dērz, a celebrated banking house in Berlin, established by Samuel Bleichröder, who died in 1855, continued by his son, Gerson Bleichröder, who died in 1893, and subsequently by the two sons of the latter. Under the patronage of Bismarck it entered into commercial relations with the Prussian government, rendering material assistance in 1866 and again in 1871. Gerson Bleichröder was raised to the hereditary peerage in 1872.

Blemmyes, blēm'ī-ez, or **Blemyes**, a people of ancient Ethiopia, who for several centuries after Christ gave much trouble to the Romans during their occupation of northern Africa. Their influence extended to a period as late as the 7th century.

Blende (German, "to blind," in allusion to the fact that the mineral is easily mistaken for galena, and yet yields no lead). A native sulphide of zinc, having the formula ZnS, and known also as sphalerite. It crystallizes in tetrahedral forms belonging to the isometric

BLLENHEIM — BLENHEIM HOUSE

system, and has a very perfect cleavage. It is commonly brown, black, or yellow, but may have other colors also, and may be nearly colorless when pure. Its hardness is from 3.5 to 4, and its specific gravity is about 4.00. It usually occurs massive, with dodecahedral cleavage, and is found commonly in connection with galena, and also in deposits of considerable extent in cavities in limestone. It is a valuable ore of zinc, and is mined near Joplin, Mo., in Cornwall (England), and in various parts of the United States, notably in Kansas, Illinois, and Colorado. The miners of Cornwall call it "mock lead" and "black-jack."

Blenheim, blén'ím, or **Blindheim**, a Bavarian village about 23 miles from Augsburg, the theatre of a great battle, fought 13 Aug. 1704 (also called the battle of Höchstädt, from another village of this name in the vicinity), in which Marlborough and Prince Eugene, commanding the allied forces of England and the German empire, gained a brilliant victory over the French and Bavarians. The latter armies were drawn into the engagement under the most unfavorable circumstances. Both these armies amounted to 56,000 men, while the forces of Marlborough and Eugene were about 52,000. The first had thrown their troops chiefly into the two villages of Blenheim and Kinzingen, which they considered as points of support for their wings, though at too great a distance in front of their main position. A large proportion of cavalry was in the centre, since each army, the Bavarian as well as the French, had their horse on their wings, and in this way those of two wings must necessarily join each other. Both the commanders would undoubtedly have perceived and corrected this mistake, as Tallard, the French general, had in Blenheim alone 27 battalions of infantry; but they expected so little to be attacked, that when the line of the allies began to move, 13 August, at two o'clock in the morning, they supposed them to be marching off. The greatest part of their cavalry was sent to forage. Even at seven o'clock, when the heads of the eight columns with which Eugene and Marlborough advanced toward the Nebelbach were to be seen, Tallard thought the whole a stratagem intended to cover the retreat; but he soon saw his error. The dispersed troops were recalled in the greatest hurry, and the cannon were drawn up in line. The French and Bavarians made every exertion to prevent the passage of the enemy over the small stream of Nebelbach, and the capture of the two villages, the conquest of which was considered by Marlborough and Eugene as decisive. Their line of attack was uncommonly long, about four and a half miles. Marlborough, in order to secure his right wing, attacked Blenheim, but without success; he then changed his plan, and threw himself with his principal forces into the wide interval between the right wing and the centre of the enemy, leaving only as many troops before Blenheim as were necessary to check the body which occupied this position. At five o'clock in the afternoon he succeeded, after great efforts, in passing the Nebelbach, by which his victory was decided. Tallard himself was among the pris-

oners; his son was killed. The consequences of the battle were decisive. Bavaria, as Marlborough had anticipated, fell into the power of Austria.

Blenheim Dog. See **TERRIERS**.

Blenheim House, the name of the seat of the Duke of Marlborough, in the parish of Woodstock, and county of Oxford. The estate having been given by Queen Anne to Marlborough for his eminent services, Parliament granted the sum of half a million sterling to erect a suitable family seat. The building was intrusted to Sir John Vanbrugh, and called Blenheim, from the village where the Duke gained his great victory. In this park once stood the royal palace of Woodstock, where Alfred is said to have resided, and which was the favorite residence of Henry II., who erected a house in the park for his favorite mistress, Rosamond Clifford, whence the well-known legend of Woodstock-bower, Queen Eleanor, and the Fair Rosamond. Edward III. was also much attached to this palace, in which his eldest son, the illustrious Black Prince, was born, as well as his youngest son, Thomas, Duke of Gloucester, usually called Thomas of Woodstock, from that event. Richard II. likewise kept his court here, at which time the poet Chaucer resided at Woodstock, in a house which stood near the present entrance to the park. During the civil wars of the 17th century it was for some time defended for the king; but it ultimately surrendered, and was much injured and dilapidated by the parliamentarians. The usual approach to Blenheim from Woodstock is through a triumphal arch or portal. In front of the building stands a sculptured column 130 feet high, surmounted by a statue of the duke, whose victories and achievements are recorded on tablets round the base. The front of the house measures 348 feet from wing to wing, and although architectural critics find many faults in detail, the general effect is in the highest degree noble and commanding. The interior is extremely magnificent; the hall, supported by Corinthian pillars, is 67 feet high; and the ceiling was painted by Sir James Thornhill, the design representing Victory crowning the Duke. The gallery and bow-window room abound in portraits by the most eminent masters, both foreign and English. On the tapestry of the latter are figured the various battles gained by the same great general, and more especially that of Blenheim. The saloon, a noble and spacious apartment, communicates with the hall, and occupies the entire breadth of the centre. The lower part is lined with marble, and six of its compartments are decorated with pictures by La Guerre, representing the inhabitants of the different nations of the world in appropriate costume. On the ceiling is a representation by the same artist, of the victorious Duke arrested in his career by Peace and Time. The remaining principal subjects of admiration are the library, theatre, state drawing-room, blue and green drawing-room, grand cabinet, the dining-room, etc. In the chapel, which forms one of the wings, is a fine marble monument by Rysbrack, to the great Duke and his almost equally celebrated duchess, Sarah. The gardens and grounds,

BLENKER—BLENNY

which are exceedingly spacious, were laid out by Brown, who contrived to make a most admirable use of the small river Glyme in the formation of a lake, or piece of water, which is justly deemed one of the greatest beauties of the place. It is crossed by several arches, and at the middle or grand approach is a magnificent bridge, the span of the centre arch of which is 101 feet.

Blenker, blenk'ér, Louis, German-American soldier: b. Worms, Germany, 1812; d. 16 Oct. 1863. He took an active part in the revolutionary movement of 1848 in Germany and was forced to leave his native land, emigrating to the United States. He organized the 8th regiment of New York Volunteers at the outbreak of the Civil War, and was its colonel. He was promoted to the rank of brigadier-general at the first battle of Bull Run, and engaged in the battle of Cedar Keys in 1862. He died of wounds received while at Warrenton, Va.

Blennerhassett, Harman, English emigrant in America: b. Hampshire, England, 8 Oct. 1764; d. on the island of Guernsey, 2 Feb. 1831. He sprang from a wealthy and highly connected house which traced its ancestry back to Edward III.; was educated at Westminster School, London, and Trinity College, Dublin, graduating 1790. The youngest of three sons, he studied for the law, but the death of his brothers soon after made him head of the family. Early in 1796 he privately married his sister's daughter, Margaret Agnew, a beautiful and highly accomplished girl of 18, also of excellent family, her father having been lieutenant-governor of the Isle of Man, and her grandfather an English officer killed at Germantown. This incestuous union brought its ultimate punishment from nature in a family of physical and moral wrecks; but a more immediate one was entire social ostracism, which soon drove him to break his entail and sell his estates, except some reserved incomes, and come to America with his wife and a library and philosophical apparatus. Arriving 1 Aug. 1796, he finally, in 1798, settled on a small island in the Ohio River a few miles below Parkersburg, W. Va., and spent \$60,000 on a house and grounds, pictures, and statuary. This was for years the show place of America west of the Alleghanies, and drew a stream of notable guests, whom he entertained with elaborate hospitality. Here he read, made music, which was his chief passion, and dabbled in feeble absent-minded scientific experiments. In 1805 Aaron Burr (q.v.) was one of his guests, and then or next year induced him to join in the scheme for a southwestern empire, to include Mexico; Blennerhassett was to be prime minister and a duke, and perhaps ambassador to England. He was a timid, dreaming, futile, unadventurous man, but, like many such, may have fancied himself a great statesman and hero *in posse*. He may, perhaps, have consented because Mexico was farther from Great Britain than the Ohio, and the canker of his life was fear lest chance should disclose his secret to his friends and children. His wife, much the stronger nature of the two, was certainly ambitious for him, and he would not have embarked in such a

venture without her approval. Anyway, he advocated Burr's "colonization" plan in the papers, and invested a great sum in arms, ammunition, provisions, boats, etc., on the faith of obligations from Burr's son-in-law Allston, which were largely defaulted. The scheme fell through; Blennerhassett was twice arrested, imprisoned and tried for treason, but discharged in 1807 on the acquittal of Burr. His place, however, had been wantonly injured by the militia, and was seized by his creditors and turned into a hemp field. The mansion was converted into a granary and was finally burned by accident. Blennerhassett now settled in Natchez, and soon after bought a 1,000-acre cotton plantation on the Mississippi, a few miles above Port Gibson, which he called La Cache. It was unsuccessful, and the War of 1812 injured his commercial speculations; and in 1819 he sold it for \$28,000 and removed to Montreal, practising law in hope of obtaining a judgeship through his old schoolmate, the Duke of Richmond. This failing, he returned to England in 1822 in hope of winning back his property by a reversionary action, and then of obtaining employment through an influence which no longer existed. In 1824 he came back after his family. Everything failed him, though he and his wife were decently treated; at last his health gave way, and he died at Port St. Pierre on the island of Guernsey. He was generous with his money while he had it, and helped out of financial difficulties several of the musicians he consorted with. His wife, though disinherited, had always had an income paid her by her sisters; and in 1838 received a property by the will of her husband's maiden aunt. In 1840 she came to the United States to push a claim before Congress for the island property, and indemnity for the ravages of the militia. Henry Clay favored it, and its passage was probable; but before it came up she died in New York, 16 June 1842. The story of her being left penniless with a dependent family (the youngest was 19 at his father's death), and of her dying in poverty and being buried by sisters of charity, are fictions. She had some literary ambitions, and while in Montreal wrote two volumes of verse, 'The Deserted Isle' (1822), and 'The Widow of the Rock, and Other Poems' (1824).

Bibliography.—Thérèse Blennerhassett-Adams, 'The True Story of Harman Blennerhassett,' in the 'Century' (Vol. 62 1901); 'The Blennerhassett Papers' (1864); Safford, 'Life of Blennerhassett' (1835); Pidgin, 'Blennerhassett,' a romance (1902).

Blenny. These small fishes of the spiny-rayed marine family *Blennidae*, frequent rocky coasts and shallows, in seas of all parts of the world. Their elongated bodies, some of which are scaleless, are remarkable for the abundance of slimy matter with which they are covered. These fishes are extraordinary in possessing but one dorsal fin, which in some species is deeply divided; and in having the faculty of using their ventral fins to aid them in moving about among the rocks and sea-weed. They are frequently deprived of water, by the ebb of the tide, when they are capable of subsisting for some hours. Small

BLENORRHOEA — BLESSINGTON

crustaceans form their main food. In some species the eggs are retained in the oviduct until they hatch, so that the young are produced alive.

Blenorrhœa, an old term signifying a muco-purulent discharge from any mucous membrane. This discharge is usually creamy white and consists usually of water, mucus, epithelial cells, white blood cells, or pus cells, and bacteria. At the present time a blenorhagic discharge is definitely named according to the structure involved. Thus a blenorhœa of the eyes is termed a purulent conjunctivitis; of the vagina, leucorrhœa; of the urethra, gleet or urethritis; if a urethritis of infectious origin, gonorrhœa, etc. Treatment is usually local and general. Tonic stimulating applications may be locally applied, and the general health built up as thoroughly as possible.

Blepharitis, an inflammation of the margin of the eye-lids and hair follicles. It may consist of a very slight hyperæmia or redness that causes itching and discomfort. This form may be due almost entirely to eye-strain and proper glasses will usually cure it. The disease may be more extensive, involving the margin and the follicles, with redness and swelling and whitish scales. The eyelashes may drop out, but usually are regrown, and there is much itching and discomfort. This form may also result from refractive errors, or may be the index of a bad constitutional state from poor food, bad surroundings, or it may follow the infectious diseases, notably measles. A more persistent form is associated with ulceration and loss of the eyelashes. This is usually a very chronic type and resistant to treatment. In the management of all forms, all errors of refraction should be corrected by properly adjusted glasses,—not on opticians' prescriptions,—and the local treatment by stimulating ointments.

Bléré, blâ-râ, a French town, in the department of Indre-et-Loire, on the Cher, 15 miles east-southeast of Tours. It contains a notably fine 16th century chapel. Pop. about 3,000. In the vicinity is the Château Chénonceaux, built in the time of Francis I., and still in excellent preservation. It was given by Henry II. to his mistress, Diana de Poitiers, who was dispossessed on the death of Henry by Catherine de Medici. In the latter part of the 18th century it was frequented by Fontenelle, Voltaire, Rousseau, and all the wits of the time, who were drawn together by the then owner of the château, Madame Dupin, widow of a *fermier-général* who died in 1799. See Cook, 'Old Touraine.'

Bles, Henri, ôñ-rê' blës, Flemish painter: b. probably at Dinant, about 1480; d. 1550. Very little is known of his career, and the 'Adoration of the Magi' in the Dresden Gallery is his only signed picture. He is known to have been a very prolific artist, and almost all the European galleries contain paintings ascribed to him.

Blesbok, blës'bök, one of the African hartbeests, now rare, which was distinguished by the violet color of its coat. See HARTBEEST.

Blessing, or **Benediction**. The expression of wishing one well soon gave rise, in early ages, to a solemn act, accompanied, like other solemnities of those periods, by symbolic signs; this was the blessing or benediction. In patriarchal times, when the authority of the head of a family included that of the priest and the civil ruler, the blessing of course appertained chiefly to him, on account of his venerable character, and when the priests began to form a separate class, became, in certain cases, a prerogative of theirs. As the authority of the father, in the infancy of every nation, is extremely great, the idea soon sprung up that his prayers, invoking the favor of the Deity, were more effectual than those of others, and that whatever he blessed would be likely to receive the favor of God. The same importance was soon attributed to blessings conferred by a priest. The heathens, the Jews, and many Christian sects, have cherished this idea. By the Jewish institutions, certain benedictions were reserved to the priest; the same is the case in the Roman Catholic Church, in which different benedictions are appropriated to different degrees of the clergy. We shall mention only a few of them. The Roman Catholic bishops alone can confer those benedictions which are connected with unction, and are called consecrations, as, for instance, the consecration of kings and queens, of the cup and *patena*, the church and altar. To them also is confined the benediction of abbots and abbesses, of knights, and the holy oil. For the benediction of the holy vestments, etc., they may employ a substitute. Every Roman Catholic clergyman may confer the benediction on the occasion of betrothment; also the marriage benediction; may bless the fruits of the earth, and the holy water. The benediction of a bishop is eagerly sought for by a faithful Roman Catholic, as contributing peculiarly to his spiritual welfare; and the Catholic clergy, in general, use the benediction as a salutation or reward for a service, etc. When the Pope rides or walks out the Roman Catholics kneel to receive his blessing, which he gives by a motion of his hand. In his ante-chamber are often seen things of different kinds, rosaries, etc., in large quantities, which he blesses in passing by. The Roman Catholic Church blesses things animate and inanimate, and this is believed by many to preserve them from sickness, injury, etc. Among most Protestant bodies there is a blessing pronounced upon the people at the close of a religious service, that of the Church of England being contained in the Prayer Book. Roman Catholics in many cases use the consecrated water in giving the benediction.

Blessington, Margaret (COUNTESS OF): b. Knockbrit, near Clonmel, Ireland, 1 Sept. 1789; d. Paris, 4 June 1849. She was the daughter of Edmund Power, and at the age of 15 was married to a Capt. Farmer, who died in 1817. A few months after his death she married Charles John Gardiner, Earl of Blessington. In 1822 they went abroad together, and continued to reside on the Continent till the Earl's death in Paris, in 1829, when Lady Blessington returned to London and took up her abode in Gore House, Kensington, which had been bequeathed to her by her husband. Here for many years she held those celebrated reunions and soirees, at which the most distinguished literary characters in London were wont to assemble. The

fascination of her manners and conversation, with her genial warm-heartedness of character, rendered these gatherings most attractive; but certain equivocal circumstances in relation to her connection with a Count d'Orsay prevented their being frequented much by respectable female society. The count had married a daughter of Lord Blessington by his first wife, and been separated from her shortly afterward, but after the death of his father-in-law, resided with the countess during the remainder of her life. Lady Blessington had made her début as an authoress in 1822 by the publication of two volumes of 'Sketches.' In 1832 she contributed to the 'New Monthly Magazine,' 'Conversations with Lord Byron,' considered by many as the best of her productions. She also wrote numerous novels, including, among others, 'The Belle of a Season'; 'The Two Friends'; 'Strathern'; and 'The Victims of Society.' None of these have much literary merit, but describe scenes in fashionable life with considerable power, and enjoyed at the time a large share of popularity. She acted as editress for several years of 'Heath's Book of Beauty' and the 'Keepsake,' and also of another annual, the 'Gems of Beauty.' In 1849 she proceeded to Paris, whither Count d'Orsay had previously gone, in the hope of obtaining an appointment under Louis Napoleon, with whom they had been intimate during his exile in England. Consult Madden, 'Life of the Countess of Blessington' (1855).

Blicher, Steen Steensen, stån stån'sën blī'ēr, Danish poet and novelist: b. Vium, Jutland, 11 Oct. 1782; d. Spentrup, 26 March 1848. His first work was a translation of 'Osian' (2 vols. 1807-9), and his first original poems appeared in 1814, but attracted little notice. He quickly won a national reputation with his novels, and in 1842 appeared his masterpiece of novel writing, 'The Knitting Room,' a collection of short stories in the Jutland dialect.

Blida, blē-dā', a fortified town of Algeria, 30 miles inland from Algiers, well-built, with modern houses and public edifices, the centre of a flourishing district, and having a good trade. There are cedar and cork trees in the neighborhood and mines of copper and lead. The principal exports are oranges, grain, tobacco, raisins, etc. It is one of the chief stations on the railway connecting Oran, Algiers, and Constantine.

Bligh, William, English navigator: b. Plymouth, England, 9 Sept. 1754; d. 7 Dec. 1817. He acquired considerable celebrity from having been the commander of the ship *Bounty* when the crew mutinied in the South Seas and carried her off. She had been fitted out for the purpose of procuring plants of the bread-fruit tree, and introducing these into the West Indies. Bligh, who had sailed with Capt. Cook, obtained the command, and in December 1787, left Spithead for Otaheite, where he arrived, and remained till April 1789. Having loaded his vessel with plants he set sail and was proceeding on his voyage for Jamaica when he was seized in bed, bound, and brought on deck. The launch was lowered, and Bligh, with 18 men supposed to be well disposed to him, were forced into it, with no other provision than 150 pounds of bread, 32 pounds of pork, a little

rum and wine, and 28 gallons of water. Thus scantily provided they found themselves in the open sea, not far from the island of Tofoa, in lat. 19° S. and lon. 184° E., and managed by admirable skill and perseverance, though not without enduring fearful hardships, to reach the island of Timor in 41 days, after running nearly 4,000 miles without the loss of a single man. Ultimately 12 of the number reached England. Of these, Bligh was one, and in a second voyage accomplished the object of the first by giving the bread-fruit tree to the West India Islands. When several of the mutineers were afterward tried at Portsmouth, sufficient evidence was obtained to show that Bligh himself was not free from blame, and had on many occasions been too much inclined to play the tyrant. This feature in his character was afterward manifested on a larger scale. In 1805 he was appointed governor of New South Wales, and acted so harshly that the other authorities interfered and put him in confinement. On his return he was made an admiral. See **PITCAIRN ISLAND**.

Blighia, blī'ī-a, a genus of numerous trees and shrubs of the natural order *Sapindaceæ*, the principal species of which is *B. saoida* (*Cuoania saoida* of some botanists), the akee tree indigenous to west tropical Africa and naturalized in the West Indies since the close of the 17th century. It is also planted in southern Florida. The tree attains a height of 30 feet, bears pinnate ash-like leaves and very fragrant whitish flowers, from which by crude distillation the colored people obtain a cosmetic and which would probably yield a valuable perfume under proper management. The rich, red fruits, as large as goose eggs, are used for dessert and largely also in cookery. In Jamaica the tree is cultivated as high as 3,000 feet above sea-level, although it can withstand slight frosts. *Cuoania anacardioides*, which also bears an edible fruit, has been introduced into California, and *C. elegantissima* is sometimes raised in warm greenhouses for its attractive foliage and racemes of white flowers.

Blight, an indefinite term applied to any diseased state of cultivated plants, but gradually being restricted to plant diseases caused either by bacteria or fungi. See sections on diseases in articles on various plants.

Blight, American, an English and Australian name for the woolly apple louse or "apple blight," one of the aphides (q.v.).

Blight-bird, a small insectivorous bird (*Zosterops caerulea*) of New Zealand, which devours the "blight" or plant-lice on fruit trees. It is one of the white-eyes (q.v.).

Blimbing, Bilimbi, Cucumber-tree (*Averrhoa bilimbi*), a tropical tree of the natural order *Geraniaceæ*, native of southern Asia, where it is largely cultivated and whence it has been introduced in other tropical countries. It is extensively raised in South America. The tree attains a height of 15 feet, bears racemes of red flowers followed by smooth cucumber-shaped green fruits as large as hen's eggs, which are highly esteemed for their acid pulp. The carambola (q.v.) is a close relative.

Blind, blīnt, **Karl**, German political agitator and writer on history, mythology, and Germanic literature: b. Mannheim, 4 Sept. 1826;

BLIND

d. London, Eng., 31 May 1907. He was educated at Heidelberg and Bonn, and from his student days till he settled in England in 1852 he was continually engaged in agitating or in heading risings in the cause of German freedom and union, being frequently imprisoned. The democratic propaganda was afterward supported by his pen; and he wrote political and biographical works: 'Fire-burial Among Our Germanic Forefathers'; 'Teutonic Cremation'; 'Yggdrasil, or The Teutonic Tree of Existence'; biographies of Freiligrath, Ledru Rollin, and Francis Deák.

Blind, Mathilde, German-English poet; b. Mannheim, 21 March 1847; d. London, 26 Nov. 1896. She went to England in 1849, and won fame by her writings: 'The Prophecy of St. Oran, and Other Poems' (Lond. 1881); 'Life of George Eliot' (1883); 'Madame Roland' (1886); 'The Heather on Fire,' a tale (1886); 'Ascent of Man' (1889); 'Dramas in Miniature' (1892); 'Songs and Sonnets' (1893); and 'Birds of Passage' (1895).

Blind. The loss of the sense by means of which man receives an idea of the world that surrounds him, clothed in light and color, is an event as melancholy as it is frequent. Blindness is different: (1) In its degrees, some persons being partially blind, retaining a slight perception of light, with the power of distinguishing very brilliant colors, and the general outlines of bodies; others being entirely deprived of the faculty of seeing. (2) In its causes: some men are blind from their birth; others have become blind by local diseases of the eyes,—for instance, —by inflammation, suppuration, cancer of the eye-ball, spots, films, tumors on the cornea (by which its transparency is destroyed), also by closure of the pupil, by a turbid state of the humors, by a debility of the optic nerve, or by general diseases of the body, violent fevers, nervous fevers, plethora, and tendency of the blood to the head, erysipelas in the face, smallpox, scarlet-fever, etc., or by excessive exertion of the eyes, by which the optic nerve is enfeebled; for which reason, some classes of mechanics and artists, as blacksmiths, laborers in glass and smelting houses, watch-makers, etc., not unfrequently lose their sight, and in northern countries, which are covered with snow for a long time, and which dazzle the eyes by the reflection of the sunbeams, as well as in the sandy deserts of Africa, blindness is a frequent complaint. Old age is sometimes accompanied with blindness, occasioned by the drying up of the humors of the eye, or by the opacity of the cornea, the crystalline lens, etc. There are several causes which may produce blindness from birth. Sometimes the eyelids adhere to each other, or to the eye-ball itself, or a membrane covers the eyes; sometimes the pupil of the eye is closed, or adheres to the cornea, or is not situated in the right place, so that the rays of light do not fall in the middle of the eye; besides other defects. Those who are born blind have no idea of vision, and are entirely destitute of all the ideas derived from the sense of sight. They cannot, therefore, be sensible of their misfortune in the same degree as those who have lost their sight at a later period. Experience has shown that those who acquire the power of seeing after being born blind, or having lost their sight in their childhood, form very different ideas of visible objects from other

persons. A young man, whom Cheselden couched for a cataract, at the moment he received sight imagined that all the objects which he saw were in contact with his eyes; he could not distinguish objects, although of very different forms. Those with which he was already familiar by the touch he examined with great attention, in order to recognize them another time; but having too many things to notice at once, he soon forgot all that he had observed. He wondered that those persons whom he loved most were not handsomer than others. Before he received his sight he had expressed a great desire to obtain this sense. The other senses of persons, who have been blind for a long time, become more exquisite, perhaps, because they are not subject to the distraction produced by the sight of so many objects. The blind, therefore, are often distinguished for a remarkable mental activity, and a wonderful development of the intellectual powers. Their touch and hearing, particularly, become very acute. Thus it is related of a blind man, who lived at Puisieux, in France, and was a chemist and musician, that he could accurately estimate the proportions of objects, could judge of the distance of fire by the degree of heat, determine the quantity of fluid in vessels by the sound it produced while running from one vessel into another, and the proximity of objects by the effect of the air upon his face. He determined very accurately the weights of bodies and the capacities of vessels. The celebrated Saunderson, professor of mathematics at Cambridge, lost his sight in his early youth. He invented several processes to facilitate his studies in arithmetic and geometry. His sense of touch was so acute that he distinguished spurious coins merely by letting them pass through his fingers, though they were so well executed that even skilful judges were deceived by them.

When it is a case of imparting instruction to persons destitute of sight, it is necessary to have recourse to the other senses to supply the want of the eye. If, for instance, we wish to teach them the arts of reading and writing, letters must be prepared which will be palpable to the touch, and the hand guided until they are able to copy them. If we wish to communicate to them a knowledge of the surface of the earth, globes and maps must be prepared with the divisions, etc., in relief. Knowledge obtained in this way must, of course, be acquired much more slowly than that received by the sight. The senses of touch and of sight differ in this respect, that the former ascends by degrees from the perception of parts to the perception of the whole, while the latter views the whole at a single glance. It is therefore evident that the blind cannot be instructed in the common schools destined for those who see: in the first place, because the means of instruction by the touch are wanting; and secondly, because the progress of the other children would be retarded by the slow apprehension of the blind pupils. (See BLIND, EDUCATION OF THE.)

The occupations in which the blind are found capable of engaging are such as the making of baskets and other kinds of wicker-work, brush-making, rope and twine-making, the making of mats and matting, knitting, netting, fancy work of various kinds, cutting fire-wood, the sewing of sacks and bags, the carving of articles in wood, etc. Piano-tuning is also successfully car-

BLIND, EDUCATION OF THE

ried on by some, the typewriter is used by others and the cleaning of clocks and watches has also been occasionally practised by them. Skilled musicians are sometimes found among the blind.

Reading Room for the Blind.—By an act of Congress passed in 1879, entitled an Act to Promote the Education of the Blind, \$250,000 was set apart to be permanently invested in securities of the United States, the proceeds of which were to be applied, through the American Printing House for the Blind at Louisville, to the making of books and apparatus used in the education of the blind, to be annually distributed to the schools for the blind in the several States in proportion to attendance. For almost a quarter of a century this benefaction has been available for the youthful blind of the country in the schools, and the books in embossed characters have multiplied amazingly. The catalogue now embraces nearly or quite every title in popular literature and technical subjects, and as only the best books are printed in raised letters, the entire catalogue constitutes the finest and best library of equal numbers in the world. There is a steady increase in the number of visitors in the reading room for the blind in the library of Congress. To Helen Marr Campbell is given by many the credit of having taken the initial steps to procure this reading room. She was a frequent visitor to the crowded rooms of the old Congressional Library, and often found the experiences there far from agreeable. The few books for the blind were often difficult to obtain and equally difficult to read in cramped rooms, and too often under the scrutiny of curious and annoying strangers. Going to John Russell Young, then librarian, she made a request for a special reading room in behalf of the blind readers of Washington. He was quick to see the justice of the request, and at once placed the fitting up of Pavilion No. 7 in the new library in charge of the second assistant librarian, David Hutcheson. This is in the extreme northwestern corner of the ground floor of the great building and is a large and well-appointed room, with square bay windows and a groined ceiling resting upon massive pillars. The alcoves along the eastern wall are filled with the specially prepared books for the blind; the Bible, making so many large volumes that it completely fills one of the alcove shelves.

Dictionary for the Blind.—The first general dictionary ever issued in any country or language was published in 1903 by the Maryland School for the Blind. It contains 40,000 words, with complete diacritical marks and definitions and fills 18 volumes. In the last 10 years more books have been printed for the blind than in all previous time. This is due largely to the rapid spread of the New York point system of printing for the blind. The new dictionary, as well as all the books from the Maryland School printing house, is printed in New York point. The American Printing House for the Blind at Louisville expends its annual subsidy of \$10,000 entirely in New York point printing. The annual appropriation of \$1,000 by the State of New York for the publication of general literature for the blind department of the State Library at Albany goes into New York point. The International Sunday-School Lessons go out weekly over the United States in New York point. Three periodicals are published in it. There is an excellent musical library in it, including a

dictionary of 6,000 musical terms. The Society of St. Francis Xavier uses the system in its publishing house for the blind.

Photophonic Books for the Blind.—A sheet of transparent paper contains, printed upon a black background, a number of small white squares, separated from each other by intervals one, two, or more lengths of a square in size. These squares, together with the intervals, represent the letters of the alphabet, exactly as do the dots and dashes of Morse. In order to enable the blind to read these letters, the printed sheet is placed in a frame between two thin plates of glass fully exposed to the light, and an opaque piece of cardboard, or some other material, with a square-shaped opening in the centre, is moved by the reader along the printed lines from left to right. Whenever the opening passes over one of the white transparent squares, the rays of light illuminating the printed sheet pass through this opening, and, by means of a photophonic apparatus, are changed into sound. In this way, the blind reader receives the letters in the form of sounds separated by longer or shorter intervals of silence, and his ear fulfills the functions of the eye.

Blind, Education of the.—When it is stated that prior to 1830 the blind of America were to be found "moping in hidden corners or degraded by the wayside, or vegetating in almshouses," it is the adult blind that is meant. Still blind children were occasionally found in these places, though it could scarcely be said that they were vegetating, as could be said of the untrained deaf children.

The British census of 1851 first showed the world that over 80 per cent of the blind are adults. Our schools for the blind were started, *first*, because of the wide-spread interest in the results of educating the young deaf and dumb, which furnished inspiration for new fields of educational endeavor; *secondly*, because the country was coming to the conviction that all the children of the state should receive education both as a matter of public policy and as a private right; and *thirdly*, because reports of what had been accomplished abroad in schools for the blind were being promulgated in our land. By 1830 the more progressive states of the east were ready to give their blind children school training. In that year the government first included in the national census the deaf and dumb and the blind. The work of the blind was to begin with scientific foreknowledge as to their number. In 1829 certain gentlemen in Boston obtained the incorporation of the "New England Asylum for the Blind." By a most fortunate circumstance, the interest and services were obtained of a graduate of Brown University, Dr. Samuel G. Howe, who after finishing his medical studies had chivalrously gone to the aid of the Greeks. Dr. Howe went at once to Europe to study methods of instruction. Upon his return, in 1832, the school was opened with six pupils. In New York the act of incorporation of the New York Institution for the Blind was passed in 1831; but funds were needed and no one went abroad to study methods. This school opened in March, 1832, antedating by a few months the school at Boston. In the very same year a German teacher of the blind, a Mr. Friedlander, most

BLIND, EDUCATION OF THE

opportune came to Philadelphia, in the hope of starting a school for the blind there. Having trained certain blind children he exhibited their accomplishments, *first*, to a few influential people, *secondly*, before a large audience among whom he distributed a leaflet, "Observations on the instruction of blind persons." A meeting of public-spirited citizens followed, funds were liberally contributed, fairs held, and the success of the cause was assured. The Pennsylvania institution for the instruction of the blind was opened in 1833, fully ten months before an act of incorporation was obtained. The three schools at Boston, New York, and Philadelphia are called the pioneer schools. All sprang from private effort and private funds. All were incorporated as private institutions, and remain so to this day. Two similar institutions for the blind have arisen in this country, that at Baltimore and that at Pittsburg.

The origin of the State schools differs from that of the type above given only in that classes of trained pupils from the earlier schools were exhibited before the state legislatures, as well as before the people. State appropriations followed and the institutions were inaugurated as state institutions. The new schools sprang into being with astonishing rapidity. There were in 1899 forty schools for the blind in the United States, and every State in the union makes provision for its blind of school age either in its own school or in that of a neighboring state. In our sparsely-settled country, especially west of the Alleghenies and south of Maryland, great efforts had to be made to find the children and still greater efforts to persuade the parents to send them to school. In certain states where the amount of the public fund seemed to preclude a special grant for the blind, pupils of this class were brought together in connection with a school for the deaf and dumb, forming "dual schools," as they are called. These institutions could not help being unfair to their blind contingent; for in nearly every such case the blind came to a school already established as a school for the deaf, and under the superintendence of a man especially interested in the education of the deaf; moreover, the number of the deaf pupils usually far exceeded that of the blind. There are still a few of these dual schools, but wherever possible they have been divided into two distinct institutions. In northern schools the colored blind are educated with the white; in southern schools it is best for the colored to have schools of their own. Both the whites and they prefer this arrangement. The first school for the colored blind was opened in North Carolina in 1869.

All the institutions for the blind were in their very inception schools. The pioneer schools imported literary teachers from Paris and handicraft teachers from Edinburgh. At first only the brighter class of pupils came under instruction. Teaching them was easy. They progressed with amazing strides; all was enthusiasm; exhibitions were called for and widely given (Dr. Howe's pupils gave exhibitions in 17 states); large editions of the various annual reports were exhausted. Soon, however, less bright pupils came to be admitted; then the curriculum of studies began to sober down to the practical and comprehensive one prevailing to-day. Whatever occupation the boy

or girl expects to follow after leaving school, it is assumed he will follow it better and thus live more happily and worthily if he has a general education. When, as was formerly the case, the period or term of schooling allowed pupils was shorter than it is now, they were not admitted before the age of eight or nine. Now that kindergarten departments have been universally added to the schools, the pupils are urged to enter at an early age; because experience has shown that at home these little blind folks are coddled rather than trained, so much so in fact that by the time many of them come to school their natural growth of body and mind has been so interfered with by inaction, that all the efforts of the schools cannot make up for lost time and opportunity. The principle of periodicity of growth has now come to be understood and the importance of applying the proper stimulus at the period most sensitive to it, comprehended. Children with good sight and hearing have got along without kindergarten training, and so have blind children, but of all the useful means of reaching and developing the average blind child none is so effective as the properly-conducted kindergarten. The practical knowledge of things comes to the blind through the hand, their fingers being veritable projections of their brains. Thus must their hands not only be trained to sensitiveness of touch but to be strong and supple, so that they may, indeed, be dexterous; for as their hands are so are their brains. The kindergarten cultivates ear and heart and hand and brain as nothing else does. Even color is not wholly omitted in kindergartens for the blind. Many see colors, and those who do not love to talk about them and certainly derive some indirect value for considering them.

Blind children with kindergarten training are more susceptible to instruction than those without it. Above this department the course of studies in American schools requires from seven to eight years, which means a primary, a grammar and a high school education, or instruction in object lessons, reading, writing, spelling, grammar, composition, arithmetic, history, physiology, botany, zoology, geology, physics, algebra, geometry, civics, English literature, typewriting and sometimes Latin and modern languages. Not a few pupils have fitted for college where they took the regular course with the seeing students, and from which they were graduated usually with distinction. Formerly much of the teaching was oral, which, in many cases, was apt to be more pleasant than profitable to the pupil. Since the general introduction of the embossed text book and tangible writing, the pupil has been forced to depend more and more upon himself, obviously with better results. In fact, the work has been growing more and more practical. The methods of teaching the blind correspond in general to those of teaching other hearing children. The common appliances have but to be raised and enlarged as in maps and diagrams, or simply made tangible, which may be done, for example, by notching an ordinary ruler so that the graduations can be felt.

Industrial training has been an integral part of the school course from the beginning. Recently educational manual training has been generally introduced as preliminary to the

BLIND, EDUCATION OF THE

trades. Sloyd has been found especially adapted to the blind. The handicrafts—chair-caning, hammock-making, broom-making, carpet-weaving, and a few others, alone remain of all the many trades taught at one time or another in our schools. Manual occupations of some kind will always be taught, even were it evident that none of them would be followed by the blind as trades; for it is by doing and making that the blind especially learn best. Then, it is essential that they be kept occupied. In the past, before the introduction of such varieties of labor-saving machinery as the last half century has seen, many of the discharged pupils followed some manual trade and succeeded in subsisting by it. To-day this is less and less possible. The mind itself of the blind is least trammelled by the lack of sight; hence some pursuit where intelligence is the chief factor would seem to be best adapted to his condition. Music, of course, opens up his most delightful field. It is said that all the force of the superintendents of the early schools was required to prevent the institutions from becoming mere conservatories of music. To-day only those pupils pursue music in regular course who have talent for it; but even those are not allowed to neglect other studies for it. It is the experience of the American schools, as of the European, that the profession of music offers to the educated and trained musician who is blind, a field in which he can work his way with least hindrance from his lack of sight, and many are they who have found in it a means of livelihood for themselves and their families. A few in nearly every school fit themselves to be tuners of pianos.

The American schools for the blind were founded upon embossed books. Dr. Howe states somewhere that the simple reading from embossed print did more to establish the schools in the country than any other one thing. Extraordinary pains were taken by Dr. Howe and his assistants to perfect a system which should be at once readily tangible to the fingers of the blind and legible to the eyes of their friends. The result was the small lower-case letter of Dr. Howe, the Boston line print, as it is often called. To this the jury gave preference before all other embossed systems exhibited at the great exhibition of the industry of all nations, in London, in 1851. Backed by such indorsement and all the authority of Dr. Howe the system was rapidly adopted into the American schools. It was then the theory that the blind would be further isolated from their friends if their alphabets were dissimilar. The blind of themselves had devised a writable system—arbitrary and composed of dots or points—one which they could both read and write. But the early superintendents would not countenance it. However, many of the blind failed to read the line-letter system; because to read it requires extreme nicety of touch, which all the blind by no means have. Characters composed of points, not of lines, are scientifically adapted to touch reading. In the 33d report of the New York institution, Supt. William B. Wait wrote: "Now, which is the more important, that all the young blind should be able to read, thus being made, in fact, like the seeing, or that they should be taught an *alphabet which in some sort resembles* that used by the seeing, but by doing which only 34 per cent of them

will ever be able to read with any pleasure or profit?" This attitude of the New York school was the outcome of statistics gathered from seven institutions, in which 664 pupils were involved, and of experiments made by Mr. Wait with his own pupils, using a system scientifically devised by him, composed of points in arbitrary combination. This was in 1868. At the next convention of the American instructors of the blind, it was resolved "That the New York horizontal point alphabet as arranged by Mr. Wait should be taught in all institutions for the education of the blind." Europe was a long time accepting a writable point system. That of Louis Braille, devised in 1829, though much used by individuals, was not officially adopted into the Paris school where it originated until 1854. In contrast, America devised, printed, spread, and resolved to accept its writable system in less than one-half the time. The benefits of a tangible writable system are vast. It puts the blind more nearly on a par with the seeing, particularly as pupils in school. Its adoption here, next to that of tangible printing, makes obtainable the ideal of American schools for the blind. Every tangible system has its defects. French "braille" as adopted into England has antiquated abbreviations and contractions for the use of adults; and is involved with rules allowing much bad use, like the omission of all capitals. The New York point as printed also laid itself open to much criticism as to "good use." The American braille, the latest system, combining the best features of French braille and of New York point, was devised by a blind teacher of the Perkins institution. It takes full account of "good use," and those who use the system deem it very satisfactory. In 1892, when the American braille system was adopted into several schools, a typewriter for writing braille was invented, and this was followed by the invention of another machine for embossing braille directly on plates of thin brass from which any number of duplicates could be struck off on paper. Here was a means of creating a new library at once. But the chief value of the invention lay in the fact that as the machine was simple and inexpensive and could be operated if necessary by a blind man, any institution could have a printing office of its own. And several schools immediately established such offices, from which they issued at once whatever their school classes demanded. By co-operating in the selection of the books to be embossed these schools have created in the space of seven years a library of books in American braille than which there is no superior in any system in any country, and they have added an immense amount of music in the braille music notation, which is the same all over the world. A typewriter, and a machine for embossing brass plates in the New York point system, have also appeared.

The Association of American instructors was formed in 1871, has met biennially ever since, usually as the guest of one or another of the institutions. The proceedings of each convention have been published. The principles underlying the scheme for educating the blind being to make them as little as possible a class apart from the rest of the community, it has not been deemed wise to attempt to establish a national college for the higher education of

BLIND FISHES.—BLINDAGE

those capable of taking it, but efforts are making towards enabling the brighter and worthier pupils to attend one of the colleges for the seeing, at the expense of the states or the schools from which they come. The school instruction of the blind is comparatively an easy matter. The work is less of a science than the more difficult task of instructing the deaf.

When an exhaustive census of the graduates from all over the country was compiled, it revealed the following encouraging facts: 16 became superintendents of other institutions; 214 became teachers or were otherwise employed in institutions; 34 became ministers of the gospel; 84 authors, publishers, or lecturers; 310 were engaged as teachers of music or were vocalists outside of institutions; 69 had been organists in churches; 125 piano tuners; 937 had been engaged as teachers, employees, and workers in handicraft; 277 were storekeepers, etc.; 45 became owners and managers of real estate; 760 (mostly women) were employed at housework at home or in families, or at sewing with machines, or by hand, and 78 were in homes of employment. Further, according to the census of the United States, while there were about 55,000 blind in the land, but 2,560 were found in almshouses. What proportion of these ever attended our schools, will never be known, but it must be remembered that blindness is an affliction of old age.

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Blind Fishes. See CAVE ANIMALS.

Blind Spot. The place of entry of the optic nerve in each retina is insensitive to light. Mariotte in 1668 first demonstrated the existence of the blind spot. Its existence may be easily shown as follows: Pin a large sheet of paper against the wall so that a cross marked thereon may be at the level of the eyes; fix the position of the head by means of a headrest (a ruler about 50 centimeters in length, held by the teeth at one end, the other end resting against the paper, is a convenient headrest); with one eye closed or covered, look steadily at the cross with the other eye; move a pencil, that has been covered with paper so that the point only shows black, from the cross toward the temporal side of the field of vision; mark on the paper the position at which the pencil point disappears; move the pencil farther and mark the

position at which the point re-appears. By moving the point in various directions near this place on the paper, and marking the positions where the pencil point disappears, and re-appears, a series of marks may be made which furnish an outline figure of the form of the blind spot. The diameter of the blind spot (1.5 mm.) corresponds to a visual angle varying from $3^{\circ} 39'$ to $9^{\circ} 47'$. The average is about 6° . An image of light sufficiently small thrown upon the optic nerve by means of the ophthalmoscope, gives rise to no sensations. These experiments show that at the blind spot we see nothing, yet, as we look at this page with one eye only the surface appears to be covered with letters in the regular forms; there is no blank space corresponding to the blind spot. In binocular vision the blind spot of one retina is covered with a sensitive portion of the other retina. Why we should not be aware of our inability to see a continuous field with one eye, is a problem for which there are two proposed explanations. The blind spot may be filled out by association, whose nature is determined by the character of the surrounding field, or, by eye movements which serve as retinal local signs for the insensitive region. Probably the two processes are necessary and aid each other in presenting to the mind the continuous visual field. Consult: Ladd, 'Elements of Physiological Psychology'; Helmholtz, 'Physiologische Optik' (1901); Sanford, 'Course in Experimental Psychology' ex. 113, 114; Wundt, 'Physiologische Psychologie' (1893); Titchener, 'Experimental Psychology.'

Blind Tom (BETHUNE, THOMAS), a musical freak: b. about the middle of the 19th century; d. Hoboken, N. J., 13 June 1908. He was a negro slave in Georgia, and was born blind and with very weak mental development. He showed remarkable aptitude for music and after hearing a piece played once could reproduce it accurately on the piano. He also performed other musical wonders, and for several years was exhibited in various cities. His lack of intellect developed into almost brutal idiocy.

Blindage, in operations against fortresses, the name of all preparations which tend to intercept the view of the enemy. There are several species: (1) A fascine placed across the embrasures, to prevent the enemy from observing what passes near the cannon. (2) Blinds before port-holes are shutters made of strong planks, placed before the port-holes, as soon as the guns are discharged, to obstruct the enemy's view. (3) Single and double blinds. The former consists of three strong perpendicular posts, five feet in height, between which are planks covered with iron plates on the outside, and thus made shot-proof. This screen is furnished with rollers, to enable the laborers in the trenches to push it before them. The latter consists of large wooden chests, on four block wheels, filled with earth, or bags of sand, and serve likewise in the trenches, etc., to cover the soldiers from the fire of the enemy. (4) Chandeliers used to protect the workmen in the trenches. Two square beams of timber are placed parallel, and at a distance of six feet, on the ground, and fastened by two cross beams. Upon the ends perpendicular posts are erected, and the interval is filled up with fascines, at least to a height of five feet. (5) Coverings placed over the most exposed parts in the saps or the fortress.

BLINDNESS — BLISS

These are made of beams over which hurdles or fascines are spread, that finally receive a sufficiently thick layer of earth as a covering. During the Boer war of 1899-1902 Ladysmith, Mafeking, and Kimberley were largely defended by means of bomb-proof shelters or blinds.

Blindness, inability to see, resulting from disease or injury of the external eye, of the light-receiving portions of the eye, the retina, of the nerve-conducting paths, the optic tracts, or of the light-perceiving or intellectual centres in the occipital cortex of the brain. It may be transitory or permanent, partial or complete, congenital or acquired, curable or incurable. There is a form of night-blindness, in which dim light fails to give impressions; or of day-blindness, in which excess of light is obstructive to vision. Certain regular or irregular areas on the retina may be blind; one half of one eye or of both eyes may be blind. Blindness to certain colors is a well-known form of this affection. Objects may look too small, or too large, or be distorted. See AMAUROSIS; AMBLYOPIA; BLIND; EYE, DISEASES OF.

Blinds, screens or shutters to prevent too strong a light from shining in at a window, or to keep outsiders from seeing in. Venetian blinds are made of slats of wood, so connected as to overlap each other when closed, and to show a series of open spaces for the admission of light and air when in the other position.

Blindsnake, a family of small serpents (*Typhlopidae*) having worm-shaped bodies, only a few inches in length, very rigid, and suited for burrowing. These little snakes exist in all warm countries, and lead a subterranean life, worming their way through the loose top-soil, and feeding on earth-worms, grubs, and insects. Their eyes, through disuse, have become minute and weak, and in many species almost covered by overlapping plates. In India they sometimes come out upon the surface after showers, when they are regarded with superstitious dread by the natives; but they are perfectly harmless. Many species inhabit Mexico and tropical America, two or three occurring in New Mexico and Texas, where they are frequently found in ant-hills.

Blindstory. See TRIFORIUM.

Bliss, Aaron Thomas, American politician: b. Smithfield, N. Y., 22 May 1837; d. 16 Sept. 1906. He served in the Federal army during the Civil War, and was for six months a prisoner in Andersonville, Columbia, and other Southern prisons. In 1865 he settled in Saginaw, Mich., where he engaged in lumbering, banking, and other business enterprises. He was a member of Congress, 1889-91, was elected governor of Michigan in 1900, and re-elected 4 Nov. 1902.

Bliss, Cornelius Newton, American merchant and statesman: b. Fall River, Mass., 26 Jan. 1833. He was educated in New Orleans; entered his stepfather's counting room there; engaged in the commission business in Boston, and became head of the dry goods commission house of Bliss, Fabyan & Company, New York, in 1881. He was a member of the Pan-American Conference; chairman of the New York Republican State Committee 1877-8; and treasurer of the National Republican Committee in 1892 and 1896; declined to be a candidate for gov-

ernor of New York in 1885 and 1891; and was secretary of the Interior Department in President McKinley's Cabinet in 1897-8.

Bliss, Daniel, American missionary: b. Georgia, Vt., 17 Aug. 1823. He graduated at Amherst College in 1852, and at the Andover Theological Seminary in 1855; was ordained a Congregational minister 17 Oct. 1855; engaged in missionary work in Syria in 1855-62; and in 1866 became president of the Syrian Protestant College of Beyrout. His publications include: 'Mental Philosophy' and 'National Philosophy,' both in Arabic.

Bliss, Edwin Elisha, American missionary: b. Putney, Vt., 12 April 1817; d. Constantinople, 29 Dec. 1892. He graduated at Amherst College in 1837, and at Andover Theological Seminary in 1842; was ordained as a missionary in 1843, and joined the American Mission in Turkey, being stationed at Trebizond, 1843-52; Marsovan, Armenia, 1852-6; and at Constantinople after 1856. In addition to the ordinary work of a missionary he edited, 1865-92, the 'Messenger,' published at Constantinople in the Turkish and Armenian languages, and compiled a number of text-books, notably the 'Bible Handbook,' in Armenian.

Bliss, Edwin Munsell, American missionary: b. Erzerum, Turkey, 12 Sept. 1848. He was educated at Robert College, Constantinople; at the high school, Springfield, Mass., and at Amherst College, where he graduated in 1871, later taking a course at Yale Divinity School. In 1872 he was sent to Constantinople as agent for the American Bible Society, and traveled in Turkey and Persia. On his return to the United States in 1888 he edited the 'Encyclopædia of Missions.' He has also written 'The Turk in Armenia, Crete, and Greece,' and 'A Concise History of Missions.' Since 1896 he has been associate editor of the New York 'Independent.'

Bliss, Frederick Jones, American explorer (son of Daniel Bliss, q.v.): b. Mount Lebanon, Syria, 23 Jan. 1859. He graduated at Amherst College in 1880, and at the Union Theological Seminary in New York in 1887; was principal of the preparatory department of the Syrian Protestant College of Beyrout for three years; was appointed explorer to the Palestine Exploration Fund in 1890, and is best known for his excavations and finds in Jerusalem in 1894-7. Here he unearthed an ancient city wall with towers, besides streets, drains, stairways, churches, and other structures. He has published 'Mounds of Many Cities'; 'Excavations at Jerusalem,' etc.

Bliss, George, American lawyer: b. Springfield, Mass., 3 May 1830; d. near Wakefield, R. I., 2 Sept. 1897. He graduated at Harvard College in 1851; studied for two years in Berlin and Paris, and after his return read law principally at the Harvard Law School. He established himself in practice in New York. In 1859-60 he was private secretary to Gov. Morgan; in 1861 was appointed to his staff; in 1862 became paymaster-general of New York; and in that and the following year organized three regiments of United States colored infantry under instructions from the secretary of war. In 1866 he was appointed attorney for the Metropolitan boards of excise and health; in 1872, United States attorney for the Southern District of New York, and in 1881 a

BLISS — BLISTER-BEETLE

special assistant to the United States attorney-general for the prosecution of the 'Star Route' postal cases. He drafted the New York charter of 1873; drew up the New York Consolidation Act, and was author of the first tenement-house act for the city. He published three editions of the 'Law of Life Insurance' and four editions of the 'Annotated Code of Civil Procedure.'

Bliss, Philip Paul, American singing evangelist: b. Clearfield County, Pa., 9 July 1838; killed in railroad accident, Ashtabula, Ohio, 29 Dec. 1876. He received some musical instruction from G. W. Root, but was very largely self-taught. His evangelistic work was done chiefly in conjunction with Maj. D. W. Whittle and D. L. Moody, who became his warm friend and admirer. He had a fine personal presence, a gift of ready and effective speech, and these, combined with his wonderful voice, which appealed strongly to the hearts of the multitude, gave him great power over his audiences. He frequently composed both the words and music of the songs which have made his name known throughout Christendom. Of these the most popular are: "Hold the Fort, for I am Coming"; "Down Life's Dark Vale We Wander"; "Jesus Loves Me"; "Hallelujah! 'Tis Done"; and "Pull for the Shore, Sailor." His services as a revivalist were in demand throughout the United States and Canada. His songs appeared in the following named collections: 'The Charm' (1871); 'The Song Tree' (1872); 'The Joy' (1873); 'Gospel Songs' (1874).

Bliss, Porter Cornelius, American diplomatist: b. Erie County, N. Y., 28 Dec. 1838; d. New York, 2 Feb. 1885. He was educated at Hamilton and Yale colleges; became private secretary to James Watson Webb, United States minister to Brazil; explored the Gran Chaco for the Argentine government; compiled the various Indian dialects, and investigated the antiquities of that region; and in 1866 became private secretary to Charles A. Washburn, United States minister to Paraguay. He was commissioned by President Lopez to write a history of Paraguay, and while doing so war broke out between that country and Brazil, and he was imprisoned and tortured on suspicion of being a Brazilian spy. It required the presence of an American squadron to effect his release. In 1869-70 he edited the *Washington Chronicle*; in 1870-4 he was secretary of the United States legation in Mexico, and during that time made several archaeological explorations and wrote on the opportunities of American enterprise in that country. In 1874-8 he was an associate editor of 'Johnson's Universal Cyclopædia,' and in 1879 went to South America as correspondent for the *New York Herald*.

Bliss, William Dwight Porter, American clergyman: b. Constantinople, 1856. He graduated at Amherst College in 1878, and at Hartford Theological College in 1882; was ordained a Congregational clergyman; became an Episcopal priest in 1887; organized the first Christian Socialist Society in the United States in 1889, and was president of the National Reform League. He edited 'The Dawn' (1889-96); 'The American Fabian' (1895-6); and the 'Encyclopædia of Social Reform,' and published a 'Handbook of Socialism.'

Bliss, William Julian Albert, American physicist: b. Washington, D. C., 1867. He graduated at Harvard University in 1888 and pursued a course of studies in electrical engineering at Johns Hopkins, Baltimore, at which university he became successively assistant in physics (1895-8), associate (1898-1901), and professor in the latter year. He is the author of several works bearing on his profession.

Blister, a local collection of blood serum beneath the cuticle. Blisters may be produced by a variety of agents. In all instances, however, there is irritation of the part; this is followed by dilated blood vessels and an exudation of the serum from the blood vessels near the irritant. Medicinally, blistering agents or irritants may be classified in four principal groups, as follows: rubefacients, when redness alone is produced; vesicants, when blistering is brought about; pustulants, when the blisters are usually small and contain pus; and escharotics, when burning or destruction of tissue may take place. Heat is an excellent illustration. Mild heat will cause redness; temperature above 125° to 400° F. will cause blistering; temperature above 400° will burn; and high temperatures can char. The most commonly used blistering agents are heat (the hot iron being lightly touched to the skin), mustard, capsicum, mezereum, turpentine, and cantharides. The hot iron and cantharides are preferred, because their action can be controlled. Mustard mixed with cold water makes an excellent rubefacient, but it is not advised to be used as a vesicant. Blisters are used to influence deep-seated and chronic joint, muscle, and tendon troubles. For general purposes of counter-irritation rubefacients are more serviceable than vesicants.

Blister-beetle, or **Spanish Fly**, an oil-beetle of the family *Meloidæ*, in which there is a small head and a distinct neck; the wing-covers and sides of the body without any co-adaptation, while each claw of the feet bears a long appendage closely applied beneath it. The integument is soft, flexible, and many of the species contain a substance which forms an active vesicant, called cantharadine. The Spanish fly (*Lytta vesicatoria*) is larger than any of our native species, is of a bright shining green, and when powdered and applied to the skin raises blisters. It inhabits the south of Europe, and is usually imported from Spain. Our native blister-beetles, when dried, can also be used for producing blisters or making blister-plasters. They are black or gray, and occur on potato plants, on the flowers of the golden-rod, etc. Their transformations are wonderfully complicated, since they pass through more than one larval stage (see METAMORPHOSIS). The females lay their eggs in the earth; the young, on hatching, are of a singular primitive shape, called a "triungulin," which is very active, entering the egg-pods and devouring the eggs of locusts. It soon molts, assuming a different but still active larval stage; it molts again, entering its third larval stage, when it resembles the grub of a May beetle (scarabæid stage). In the fourth stage the grub is helpless, lying on one side; it increases rapidly in size, and when fully grown leaves the remains of the egg-pod it has been living on and forms a small cavity near by. Here it lies motionless on its side, but grad-

ually contracting till the skin separates and is pushed down to the end of the body, disclosing the semi-pupa or coarctate larva, which hibernates. In the spring the skin bursts and discloses a sixth larval form like the fourth. In this stage it is again active, burrowing in the earth, but taking no food, and in a few days passes into the pupa state. Other species of the family pass through a similar hypermetamorphosis.

Blister-steel. See STEEL MANUFACTURE.

Blithedale Romance, The, the third of Nathaniel Hawthorne's romances, published 1852. It was the outcome of an intimate acquaintance with the members of the Brook Farm (q.v.) Community, and immortalized the brief attempt of that little group of transcendentalists to realize equality and fraternity in labor. It is more objective and realistic than Hawthorne's other works, and therefore in a sense more ordinary. Its central figure is Zenobia, a beautiful, intellectual, passionate woman; drawn as to some outlines, perhaps, from Margaret Fuller. At the time it opens she has taken up her abode at Blithedale Farm, the counterpart of Brook Farm. The other members of the community are Hollingsworth, a self-centred philanthropist; a Yankee farmer, Silas Forster, and his wife; Miles Coverdale, the relater of the story; and Priscilla, who is Zenobia's half-sister, though of this fact Zenobia is ignorant. 'The Blithedale Romance' is a brilliant instance of Hawthorne's power as a story-teller. No scene in the whole range of fiction is more realistic than the finding of Zenobia's body in the dead of night; drawn from the dank stream, a crooked, stiff shape, and carried to the farmhouse where old women in nightcaps jabber over it. Nothing could be more in the manner of Hawthorne than his comment that if Zenobia could have foreseen her appearance after drowning, she would never have committed the act.

Blizzard, a peculiarly fierce and cold wind, accompanied by a very fine, blinding snow which suffocates as well as freezes men and animals exposed to it. The origin of the word is dubious. It came into general use in American newspapers during the bitterly cold winter of 1880-1, although some papers claim its use as early as the seventies. Such a storm comes up very suddenly and overtakes the traveler without premonition. The sky becomes darkened, and the snow is driven by a terrible wind which comes with a deafening roar. One of the most severe of these storms recorded in the West was that of January 1888 which extended from Dakota to Texas. The thermometer in some places fell from 74° to -28° F., and in Dakota to -40°. The number of deaths amounted to 235. Children were frozen on their way home from school, and farmers in their fields, and travelers were suffocated by the fine snow. The blizzard which will long be remembered in the eastern States began 11 March 1888, and raged until the 14th, New York and Philadelphia being the cities most affected. The wind at one time blew at the rate of 46 miles an hour. The streets and roads were blocked, railroad trains snowed up for days, telegraphic communication cut off, and many lives were lost.

Blizzard State, a nickname for South Dakota.

Bloat, Hoven, or Tympanites, a diseased condition of sheep or cattle, consisting of distention of the first stomach (rumen) and commonly caused by an overabundance of leguminous diet. Animals unaccustomed to graze in clover are liable to the malady, but over-eating of grain may also produce bloat. The use of cathartic remedies, such as Epsom salts or linseed oil, will often prove effective, except in severe cases. Sometimes the accumulation of gas in the rumen is so abundant and distressing that relief must be obtained by an incision made by a surgical instrument.

Bloch, Karl Heinrich, Danish painter: b. Copenhagen, 1834; d. 1890. He studied at the Copenhagen Academy and in 1852 went to Italy where he spent about 12 years. In 1883 he became a professor in the Academy in which he had been trained. Although his chief paintings are historical, he was also successful in nature-studies, and some of his pictures are notable for their humorous characteristics. Among his works are: 'Peasant's Cottage'; 'Roman Street Barber'; 'James of Scotland Visiting Tycho Brahe'; 'Christian II.'; and two frescoes in the Copenhagen University.

Bloch, Marcus Eliezer, Jewish naturalist: b. Anspach (of poor parents), 1723; d. 1799. In the 19th year of his age he understood neither German nor Latin, nor had he, with the exception of some rabbinical writings, read anything. Nevertheless he became tutor in the house of a Jewish surgeon in Hamburg. Here he learned German and Latin, and besides acquired some knowledge of anatomy. His principal work is the 'Natural History of Fishes' (folio, 1785-99), adorned with many colored plates.

Block, or Blok, Adriaen, Dutch navigator who visited Manhattan (now New York) about 1613 and again in 1614 in the Tiger. This ship being accidentally burned he built the Unrest, a craft of 16 tons, in which he coasted as far north as Nahant, discovering the Housatonic and the Connecticut rivers and the island which bears his name. See BLOCK ISLAND.

Block, a mechanical contrivance consisting of one or more grooved pulleys mounted in a casing or shell which is furnished with a hook, eye, or strap by which it may be attached to an object, the function of the apparatus being to transmit power or change the direction of motion by means of a rope or chain passing round the movable pulleys. Blocks are single, double, treble, or four-fold, according as the number of sheaves or pulleys is one, two, three, or four. A running block is attached to the object to be raised or moved; a standing block is fixed to some permanent support. Blocks also receive different denominations from their shape, purpose, and mode of application.

Block Books, before, and for a short time after, the invention of printing, books printed from wooden blocks, each the size of a page and having the matter to be reproduced, whether text or picture, cut in relief on the surface. These were intended for the popular use and were adorned with crude paintings, the makers of block books and card painters being the same till about the opening of the 15th century. As their work increased in favor they devised the process of block printing, cutting into

BLOCK COAL — BLOCKADE

wooden blocks or metal plates in such a manner as to leave letters and pictures in relief, and after applying color to these, taking impressions from them. One or both sides of the sheet were printed from these blocks. See also **PRINTING**.

Block Coal, the name of certain kinds of bituminous coal having a tendency to break into forms approaching the cube. See also **COAL**.

Block Island, an island in the Atlantic Ocean, midway between Montauk Point, L. I., and Point Judith, R. I.; eight miles long, and from two to five miles wide. It belongs to the State of Rhode Island, from the shore of which it is about 10 miles distant. It has become a noted summer resort, and constitutes the township of New Shoreham. Pop. about 2,000.

Block Printing. See **PRINTING**.

Block System, a system of working the traffic on railroads according to which the line is divided into short sections, each section with a signal and telegraphic connection at the end. The essential principle of the system is that no train is allowed to enter upon any one section till that section is signalled wholly clear, so that between two successive trains there is not merely an interval of time, but also an interval of space. See **RAILWAY SIGNALS**.

Block Tin. See **TIN**.

Blockade is the rendering of intercourse with the seaports of an enemy unlawful on the part of neutrals, and it consists essentially in the presence of a sufficient naval force to make such intercourse difficult. It must be declared or made public, so that neutrals may have notice of it. If a blockade is instituted by a sufficient authority, and maintained by a sufficient force, a neutral is so far affected by it that an attempt to trade with the place invested subjects vessel and cargo to confiscation by the blockading power. The term is also used to describe the state of matters when hostile forces sit down around a place and keep possession of all the means of access to it, so as entirely to cut off its communication with the outside world, and so compel surrender from want of supplies.

To be sufficient, the blockade must be effective and made known. By the convention of the Baltic powers of 1780, and again in 1801, and by the ordinance of Congress of 1781, it is required that there should be a number of vessels stationed near enough to the port to make the entry apparently dangerous. The government of the United States has uniformly insisted that the blockade should be made effective by the presence of a competent force stationed and present at or near the entrance of the port. (1 Kent Com. 145.) But an accidental absence of the blockading force, or the circumstance of being blown off by the wind, if the suspension and reason of the suspension are known, will not be sufficient in law to remove a blockade. But negligence or remissness on the part of cruisers stationed to maintain the blockade may excuse persons, under certain circumstances, for violating the blockade. Taylor ('*International Public Law*,' p. 767), upon this subject, says:

"Under that rule the government of Great Britain naturally accepted the contention of that of the United States, made during the American Civil War,

to the effect that the legal efficiency of the blockade of Charleston,—usually maintained by one ship lying off the bar between the two principal channels, with two or three others cruising outside within signalling distance,—was not destroyed by the absence of the Niagara, a blockading vessel whose withdrawal, in the attempt to intercept a cargo of arms expected at another part of the coast, left the harbor open for at least five days. It was admitted, under the British rule, that there was no cessation of the Charleston blockade, despite the fact that a large number of vessels succeeded in passing it, owing to the peculiar nature of the coast. As there is no rule requiring the blockading squadron to remain within a certain distance of the place blockaded, provided access is really interdicted, Buenos Ayres was held to have been sufficiently blockaded by vessels stationed in the vicinity of Monte Video; and, in like manner, the blockade of Riga was maintained, during the Russian war in 1854, at a distance of one hundred and twenty miles from the town by a ship in the Lyser Ort, a channel three miles wide, forming the only navigable entrance to the gulf."

When on 21 Nov. 1806, the Berlin Decree of Napoleon I. declared the whole British Islands in a state of blockade, that blockade, being ludicrously ineffective, was illegal; so also, though to a somewhat less extent, were the British Orders in Council of 11 and 21 Nov. 1807, which placed France and all its tributary states in a state of blockade. The retaliatory Napoleonic Milan Decree of 27 Dec. 1807, extending the previously announced blockade to the British dominions in all quarters, labored to a still greater extent under the same defect. More effective, as being more limited in area, were the blockades of the Elbe by Great Britain in 1803, those of the Baltic by Denmark in 1808-9 and 1864, those of the ports of the Confederate States of America by President Lincoln on 19 April 1861, and that of the Cuban ports by the United States in 1898.

To involve a neutral in the consequences of violating the blockade, it is absolutely necessary that he have due notice of it. This communication may be communicated in two ways, either actually by a formal notice from the blockading power, or constructively, by notice to his government, or by the notoriety of the fact. Formal notice is not required; any authentic information is sufficient. Phillimore, '*International Law*' (page 397); Taylor, '*International Public Law*' (1901, p. 768). A violation may be either by going into the place blockaded, or by coming out of it with a cargo laden after the commencement of the blockade. For a master to place himself so near a blockaded port as to be in a condition to slip in without observation is a violation of the blockade, and raises the presumption of a criminal intent. The sailing for a blockaded port, knowing it to be blockaded, is, it seems, such an act as may charge the party with a breach of the blockade. (1 Kent Com. 150; 5 Cranch, 335.) By provision in the treaties between the United States and Greece, Prussia, and Sweden and Norway, it is agreed that vessels arriving at a port supposed at the time of departure to be blockaded shall not be captured and condemned for an attempt to enter, unless on proof that they had or could have learned of the continuance of the blockade, but an attempt to re-enter after warning will subject them to condemnation. Vessels in port before the establishment of the blockade are to be permitted to depart with their cargoes. They are usually allowed from 15 to 45 days in which to make their exit. Any one running a blockade does so at his peril; his government, by international law, cannot protect him from for-

BLOCKHOUSE — BLOEMFONTEIN

feiting his vessel with its cargo, and his liberty if he be captured by the blockading fleet. See INTERNATIONAL LAW; U. S., DIPLOMACY OF THE.

Blockhouse, in fortification, a house made of beams joined together crosswise, and often doubled, with a covering and loopholes, large enough for from 25 to 100 men. In addition to this, it is commonly covered with earth, to render it entirely bomb- and fire-proof. Forts of this kind are often fitted up to receive cannon. Blockhouses are generally built in the form of a square or a cross. Their use is to afford a feeble garrison of an important place, which is very much exposed, an opportunity of holding out against the cannonade and assault of the enemy till they are relieved. They also serve for bomb-proof guardhouses, and places of last resort, in the interior of intrenchments, and in the covered passages of fortresses, where the cannon are stationed. Blockhouses were much employed as a defense against Indians in America, by the French in Algeria, and by the Spanish in Cuba, where a line of blockhouses connected by wire barricades was built across the island in 1898.

Blocks of Five, a political expression in the United States, originating in the presidential campaign of 1888. A letter purporting to have been written by the treasurer of the Republican National Committee to the chairman of the Indiana State Committee, recommending securing "floaters in blocks of five." This was construed to mean the bribery of voters at wholesale rates. The Democratic managers circulated the letter as widely as possible, before election. Proceedings for libel were afterward begun, but never brought to trial.

Blocksberg, the name of several elevations in Germany, particularly the Brocken (q.v.), forming the summit of the Hartz Mountains and the highest point in the northern part of the empire.

Blodgett, Lorin, American statistician: b. near Jamestown, N. Y., 25 May 1823; d. Philadelphia, 24 March 1901. He was educated at Hobart College; appointed assistant professor at the Smithsonian Institution, Washington, D. C., in charge of researches on climatology, 1851; was employed on the Pacific Railroad survey for the War Department, 1852-6; and was engaged in the United States treasury department, 1863-77. He was also editor of the Philadelphia *North American*, and secretary of the board of trade of that city, 1858-64. He is credited with having laid the foundation of American climatology. His publications include 'The Climatology of the United States' (1857), a work that met high favor in the United States and Europe; 'Commercial and Financial Resources of the United States'; and about 150 volumes of reports.

Blodgett, Henry Williams, American jurist: b. Amherst, Mass., 21 July 1821; d. Waukegan, Ill., 9 Feb. 1905. He was educated at Amherst Academy; studied surveying and engineering; was admitted to the bar in 1844; and settled in Waukegan, Ill., to practise, in the following year. He served in the lower house of the legislature, 1852-4, and in the State Senate, 1859-65; and was United States district judge for the Northern District of Illinois, 1869-93, when he retired. He was ap-

pointed one of the counsel on the part of the United States before the arbitration tribunal on the Bering Sea fur-seal controversy between the United States and Great Britain, in 1892.

Blodgett, Samuel, American inventor: b. Woburn, Mass., 1 April 1724; d. Haverhill, Mass., 1 Sept. 1807. He took part in the French and Indian war; was a member of the expedition against Louisburg in 1745; and subsequently became a judge of the court of common pleas in Hillsboro County, N. H. He was the inventor of an apparatus by which he recovered a valuable cargo from a sunken ship near Plymouth, Mass., in 1783. His success led him to go to Europe for similar enterprises. He met with no encouragement in Spain, and in England proposed to raise the Royal George, which went down off Spithead with 800 persons on board, but his proposition was not accepted. In 1793 he began the construction of the canal around Amoskeag Falls in the Merrimac which now bears his name, but did not live to complete the work.

Bloede, blé'dé, Gertrude, American poet and novelist, better known as STUART STERNE: b. Dresden, Saxony, 10 Aug. 1845; d. Baldwin, L. I., 14 Aug. 1905. She wrote in verse 'Angelo' (new ed. 1879); 'Giorgio and Other Poems' (1881); 'Beyond the Shadow, and Other Poems' (1888); 'Piero da Castiglione'; and 'The Story of Two Lives,' a novel.

Bloemaert, bloo'märt, or Blom, Abraham, Dutch painter: b. Gorkum about 1565; d. Utrecht, 1647, or more probably 1657. His paintings are reproached with various faults, yet he is distinguished by the brilliancy of his coloring and the richness of his invention. He painted all sorts of objects, but his landscapes are the most esteemed. He had four sons, of whom Cornelis (b. Utrecht, 1603; d. Rome, 1680), was a distinguished engraver.

Bloemen, Jan Frans van, Flemish painter: b. Antwerp, 1662; d. Rome, 1748 (?). He was surnamed "Orizzonte," an allusion to the great beauty of the coloring he put into his landscapes.

Bloemen, Pieter van, Flemish painter, brother of Jan Frans: b. Antwerp, 1651; d. 1662. After study in Italy he was appointed dean of the Guild of St. Luke in his native city. His work is chiefly landscapes and military subjects. He is known as STANDAERT.

Bloemfontein, bloom'fön-tin, Orange River Colony, South Africa; the chief town and seat of government of the colony, 680 miles northeast of Cape Town, situated in an elevated and healthy region. It stands on a plain surrounded by low hills, and is regularly laid out, having a large market-square in the centre. It has several fine buildings, including the Anglican cathedral, the Dutch Reformed church, and other places of worship; the presidency; the town-hall; the post-office; the library; the national museum; the new Raadzaal, or council-chamber of the legislature; the old Raadzaal; Grey College and St. Andrew's College for boys; the Eunice Institute for girls; a government hospital and a cottage hospital; a lunatic asylum, etc. It is on the main railway line of the Colony, which is continuous with the Cape Colony and Transvaal systems. Pop. about 8,000, half being whites.

BLOIS — BLOMMAERT

In the war between Great Britain and the South African and Orange Free State republics in 1899-1900 it was the seat of important military operations. In June 1899, a conference was held here between President Kruger of the South African Republic, and Sir Alfred Milner, the British commissioner of Cape Colony, with a view of averting war. After the appointment of Lord Roberts to the supreme command of the British forces operating against the Boers, he led an expedition against the city and forced its surrender on 13 March 1900. Soon afterward the republic was formally placed under British administration, and it is now a part of the Union of South Africa.

Blois, blwā (anciently BLESUM), France, the capital of the department Loir-et-Cher, 99 miles south-southwest of Paris, situated on the right bank of the Loire, from which it rises in the form of an amphitheatre. It consists of an upper town, with very narrow and crooked streets; a lower town, with many handsome houses, extending along a handsome quay; and of several suburbs, with one of which it communicates by a stone bridge of 11 arches. The city is furnished with spring water through an old Roman aqueduct, in excellent preservation. Thierry, the historian, was born here. The castle of Blois is rich in historical associations. It was long occupied by the counts of the name, and became a favorite residence of the kings of France. Louis XII. was born, Francis I., Henry II., Charles IX., and Henry III. held their courts in it; and the Guises, by a cruel though not unjust retribution, were murdered in it. When Maria de' Medici was, in 1617, exiled from the court, she resided, probably as a prisoner, in this castle, whence, 18 months later, she escaped through a high window, which is also an object of curiosity. In 1814, on the approach of the European armies to Paris, the Empress Maria Louisa and the council of regency repaired for a while to this place. Afterward the castle was entirely neglected, and even used as barracks for cavalry. During the later years of Louis Philippe's reign, this curious specimen of architecture was carefully and tastefully restored. Blois has several literary and scientific societies, a botanical garden founded by Henry IV., a public library with 19,000 volumes, a departmental college, and a diocesan seminary. It trades in wines, spirits, vinegar, staves, and licorice, while it produces serges, hosiery and gloves, cutlery and hardware. Pop. about 30,000.

Blok, Petrus Johannes, pā-troos yō-hān-ēs, Dutch historian: b. Helder, 1855. He was educated at Leyden; in 1884 became professor of history at Croningen and later at the University of Leyden. He was also Queen Wilhelmina's tutor in history. His work has been chiefly in social-political history of the Netherlands. He is the author of 'History of the People of the Netherlands' (translated into English); 'Eene Hollandsche stad in de Middeleeuwen' and 'Eene Hollandsche stad onder de Bourgondisch-Oostenrijksche Heerschappij.'

Blomfield, Charles James, English divine: b. Bury-St.-Edmunds, Suffolk, 1786; d. Ful-

ham, 5 Aug. 1857. He studied for the church at Cambridge, where he took high honors; and after filling several curacies, and acting for a time as chaplain to the bishop of London, was presented to the rectory of St. Botolph, Bishopsgate. In 1824 he was made bishop of Chester, and in 1828 bishop of London. He acquired considerable renown as a classical scholar from the editions published by him of several of the dramas of Æschylus, and he also published an edition of Callimachus, which is much esteemed. Along with Rennel, he edited, in 1812, the 'Musæ Cantabrigienses,' and in 1814, along with Monk, the 'Posthumous Tracts' of Porson, followed two years afterward by the 'Adversaria Porsoni.' In his ecclesiastical capacity he displayed great zeal and energy, more churches having been built in London under his episcopate than under that of any bishop since the Reformation. He incurred, however, some animadversions on his proceedings in relation to the Tractarian controversy by a vacillating policy, which gave satisfaction to neither of the parties.

Blomfield, Edward Valentine, English clergyman (brother of the preceding): b. 1788; d. October 1816. He studied at Caius College, Cambridge, and excited the highest expectations. Among several prizes which he gained was a medal assigned him in 1809 for his beautiful ode 'In Desiderium Porsoni.' In 1812 a fellowship in Emmanuel College was conferred on him. In 1813 he visited Germany, where he acquired a good knowledge of the German language, and became acquainted with Wolf in Berlin, and Schneider in Breslau. After his return he wrote in the 'Museum Criticum,' or 'Cambridge Classical Researches,' remarks on German literature which were received with approbation. The University of Cambridge appointed him one of the preachers of St. Mary's Church. He began a translation of Schneider's 'Griechisch-Deutsches Lexicon,' but did not live to finish it. Matthiæ's 'Griechische Grammatik,' however, he translated completely. His translation was published by his brother and was everywhere well received. He was in Switzerland in 1816 with his pupil, a young nobleman, and in his haste to return to Cambridge on hearing that he was appointed proctor for the following year, the fatigue of rapid traveling occasioned a sickness of which he died.

Blomfield, Reginald, English architect: b. 20 Dec. 1856. He was educated at Exeter College, Oxford. He is architect to the Army and Navy Society and among his many important professional works are 'Brocklesby Park,' 'Caythorpe Court,' 'Holbrook House,' 'New Buildings at Haileybury College,' 'Lady Margaret Hall,' 'Portsea Institute.' He has published 'The Formal Garden in England' (1892); 'A History of Renaissance Architecture in England' two works of great value (1897); 'Short History of Renaissance Architecture in England' (1900).

Blommaert, blōm-mārt, Philip, Flemish philologist: b. Ghent about 1809. He has done much for the literature of his country

by an edition of the old Flemish poets of the 11th, 12th, 13th, and 14th centuries, with glossaries, notes, and emendations. He has also republished the 'Nibelungenlied,' translated into Dutch iambics. His best work, however, is the 'Aloude geschiedenis der Belgen of Nederduitschers,' in which he vindicates the claims of his country to an independent national existence and national literature. Blommaert also writes French well, and is a contributor to the 'Messenger des Sciences Historiques.'

Blommaert, Samuel, Colonial patroon: b. 1590; d. 1670. He bought a tract of land almost equal in size to the present State of Delaware, extending from Cape Henlopen to the mouth of the Delaware River. The deed for this land given him by Peter Minuit, and his Council is the oldest deed for land in Delaware. He formed a company to provide for the settlement of this land, and a colony was started, but destroyed by the Indians after a few years in revenge for an act of the governor, Gillis Hosset.

Blond, Jacques Christophe le, zhāk krīs-tof le blondt, printer of engravings: b. Frankfurt-on-the-Main, 1670; d. Paris, 1741. He was bred a painter, and in 1711 went to Amsterdam, and some years after to England. He conceived the idea of an establishment to print engravings in colors, and, obtaining means, produced many copies of engravings and pictures, which of course had defects, and the experiment failed. He now devoted himself to producing the cartoons of Raphael in tapestry, but this failed also, and he soon after died.

Blon'del, a confidential servant and instructor in music of Richard Cœur de Lion of England, about the year 1190. While his master was the prisoner of the Duke of Austria, Blondel went through Palestine and all parts of Germany in search of him. He understood, it is said, that a prisoner of rank was confined in Löwenstein Castle, and hastened hither. Placing himself under a grated tower, he began to sing one of the French lays which he had formerly composed for Richard. Scarcely had he finished the first stanza when a voice from the dungeon of the tower responded. Thus he discovered his king, delivered him, and gained the name of the "faithful Blondel." Grétry's fine opera, 'Richard Cœur de Lion,' is founded on this anecdote.

Blondin, Charles Emile Gravelet, shāri a-mēl grāv-lā blōn-dān, French acrobat: b. St. Omer, Pas-de-Calais, 1824; d. London, 22 Feb. 1897. He was trained at Lyons, where he made such rapid progress that he was designated "The Little Wonder." After making a several years' tour of the United States, on 30 June 1859, before a crowd of 25,000 persons, he crossed the Falls of Niagara on a tight-rope in five minutes; on 4 July he crossed blindfold, trundling a wheelbarrow; on 19 August he carried a man on his back; on 14 Sept. 1860 he crossed on stilts in the presence of the Prince of Wales. His engagement at the Crystal Palace in 1862, where he performed on a rope 249 yards long, and 170 feet from the ground, drew immense

crowds. After several years' retirement he reappeared in 1880, and in 1888 again performed in London, where he died.

Blood, Thomas (commonly called COLONEL BLOOD): b. Ireland, 1618; d. 1680; was a disbanded officer of Oliver Cromwell, and a man distinguished in various audacious enterprises. He made an attempt to steal the crown and regalia from the tower, in which he almost succeeded. Being, however, taken, he confessed his purpose without showing the least fear of death. Charles II. from idle curiosity, went to see him, and Blood persuaded the monarch to pardon him. Charles even bestowed an estate with \$2,500 a year upon him, while poor Edwards, the keeper of the jewel-office, who valiantly defended the crown and was wounded, lived forgotten.

Blood, the yellowish to reddish liquid alkaline medium present in the arteries and veins, the chief tissue of oxidation in the animal body. The composition and character of the blood varies very widely in different animals, and hence this description is confined more particularly to the human blood. From the standpoint of cell-structure the blood is a tissue made up of a liquid plasma and solid cells or corpuscles. It contains at least four separate and important ingredients, the plasma, or blood serum; red cells, or erythrocytes; white cells, or leucocytes; and blood plates. About one tenth to one twelfth of the entire body is blood, of which nine tenths is water.

Plasma.—The greater portion (56 per cent) of the blood is plasma. This plasma is composed of 90 per cent water containing gases, mineral salts, fats, nitrogenous bodies, and carbohydrates in solution. It is a clear yellowish fluid. The mineral salts are sodium chloride, common salt, the most abundant; sodium carbonate, which renders the blood alkaline; potassium chloride, potassium sulphate, calcium phosphate, sodium phosphate, magnesium phosphate, and calcium chloride. Traces of other inorganic salts are frequently found. The gases in the blood plasma are oxygen, nitrogen, and carbon dioxide. Of the organic constituents the non-nitrogenous ones are the fats and carbohydrates, with small amounts of fatty coloring matters, lipochromes, cholesterin, and sarcos-lactic acid. The fats are present in variable quantities, being particularly abundant following a meal. They are the glycerides of stearic, oleic, and palmitic acids. The carbohydrates are at least three, glycogen, dextrose or grape sugar, and animal gums. The non-proteid nitrogenous constituents of the plasma consist largely of the waste extractives. The most important of these are urea, kreatin, kreatinin, uric acid, and hippuric acid. Three ferments or enzymes are thought to be present in the plasma—a diastatic ferment, converting starches into sugars; a glycolytic enzyme, breaking up sugar, and a lipase, or fat-splitting enzyme. In addition, there is the ferment that causes coagulation. Whether this is present in the serum or in the white cells is a matter of inquiry. The proteids of the plasma are serum albumins, globulins (serum globulin and fibrinogen), and nucleo-proteids.

BLOOD — BLOOD FEUD

Red Cells.—These are the most abundant of the formed elements of the blood, making up 99 per cent of the corpuscles. There are thought to be in man at least 5,000,000 red blood-cells to every cubic millimetre of blood; their size, therefore, is very small, averaging in man 7.8 m.m. They are flattened circular disks, with double depressed centres, one fourth as thick as broad. In the embryo and in certain diseased states the red blood-cells have a nucleus, but the normal red blood-cell in man has lost this cell-structure. Practically all of the mammals, save the camel tribe, have circular red blood-cells; the camels and most of the lower animals have oval red blood-cells; in the lower animals they are mostly nucleated. There is also great variation in size in the red cells of the various animals, being largest among the *amphibia* (*Amphiuma* 75 m.m.). The red blood-cells are mostly manufactured in the marrow of the long bones. The chemical structure of the red cells is complex, but they contain an iron compound, hemoglobin, which is the most important constituent of the blood in the process of respiration and oxidation; by it the complex processes of chemical interchange in the body (metabolism) are made possible. Poisoning of the hemoglobin and the loss of its function means death by asphyxia. The hemoglobin gives the reddish-yellow tinge to the blood, and the differences in shade between venous blood and arterial blood are due to the state of oxidation of the hemoglobin.

White Cells — Leucocytes.—These are much less numerous than the red cells, varying in number from 5,000 to 20,000 to the cubic millimetre. At least five different forms of white cells are normally present in human blood. These are large and small lymphocytes, polymorpho-nuclear neutrophils, eosinophiles, and transitional forms. Mast cells are another form of varying occurrence. The polymorph neutrophils are the most numerous of the leucocytes and make up the greater mass in pus-cells. In shape and size these white cells differ, but all are spherical, some smaller than the red cells (6.7 m.m.), but mostly larger (about 10 m.m.), and all have one or more nuclei. The leucocytes are formed in a number of lymphatic tissues, the hæmolymp glands, the spleen, etc., and are among the most interesting of the constituents of the blood, since one of their chief functions is to protect the body from disease-producing micro-organisms. They may be aptly termed the human body's «army of the interior» in the fight with disease-causing agents. They are useful both physically (by eating, as it were, the bodies of invading bacteria—phagocytosis, q.v.) or chemically (in the elaborating of certain counter-poisons—antitoxins, q.v.), or in the manufacture of specific immunizing bodies for the blood-serum (see IMMUNITY). Their careful study in diseased conditions is very helpful in arriving at a diagnosis of the disease process.

Blood Plates.—These are of frequent occurrence, but as yet little is known of their function. They are thought to be globulin-like in their nature, and of use in the phenomenon of coagulation; others claim them

as nucleo-proteids, made from the white blood-cells.

Functions of the Blood.—These, as already indicated, are numerous. Through the hæmoglobin, blood is the great oxidizing medium. It carries products for anabolism and products of katabolism, and is the great equalizer, by arterial pressure, of the osmotic pressures of all the cells of the body. As a means of defense in the struggle with parasitic invaders the blood is the most important of the body's bulwarks. See BLOOD DISEASES.

(Consult Ewing, 'Clinical Pathology of the Blood' (1902), with a most exhaustive bibliography on all blood subjects. For physiology see Schäfer, 'Physiology,' Vol. I., 1898.)

Blood, Avenger of, in Scripture, the nearest relation of any one that had died by manslaughter or murder, so called because it fell to him to punish the person who was guilty of the deed. In the political law of Israel the practice of punishment by the nearest relative, which had always been prevalent, was allowed to continue, while rules were laid down to prevent the chief abuses connected with it. The distinction was sharply drawn between murder and manslaughter. For the former no ransom or satisfaction was permitted. In the case of the latter, however, there were six cities set apart out of the number which the Levites occupied, placed at suitable distances over the extent of the land, three on each side of the Jordan, with roads leading to them which were well kept up, and these were cities of refuge to which the manslayer might flee, and within which he might dwell in safety without fear of the avenger. But he was not permitted to return to his own place; in fact, he had no safety, if he left his place of refuge, until the death of the high-priest during whose term of office his misfortune had occurred. See CITIES OF REFUGE.

Blood Clam, or Blood Quohog, a local name given in Narragansett Bay to *Arca* or *Scapharca, transversa*, a common bivalve ranging from Narragansett Bay to Georgia, in reference to the reddish spots on the inside of the edge of the shell, and to the reddish flesh-color of the ovaries. It is not used as an article of food.

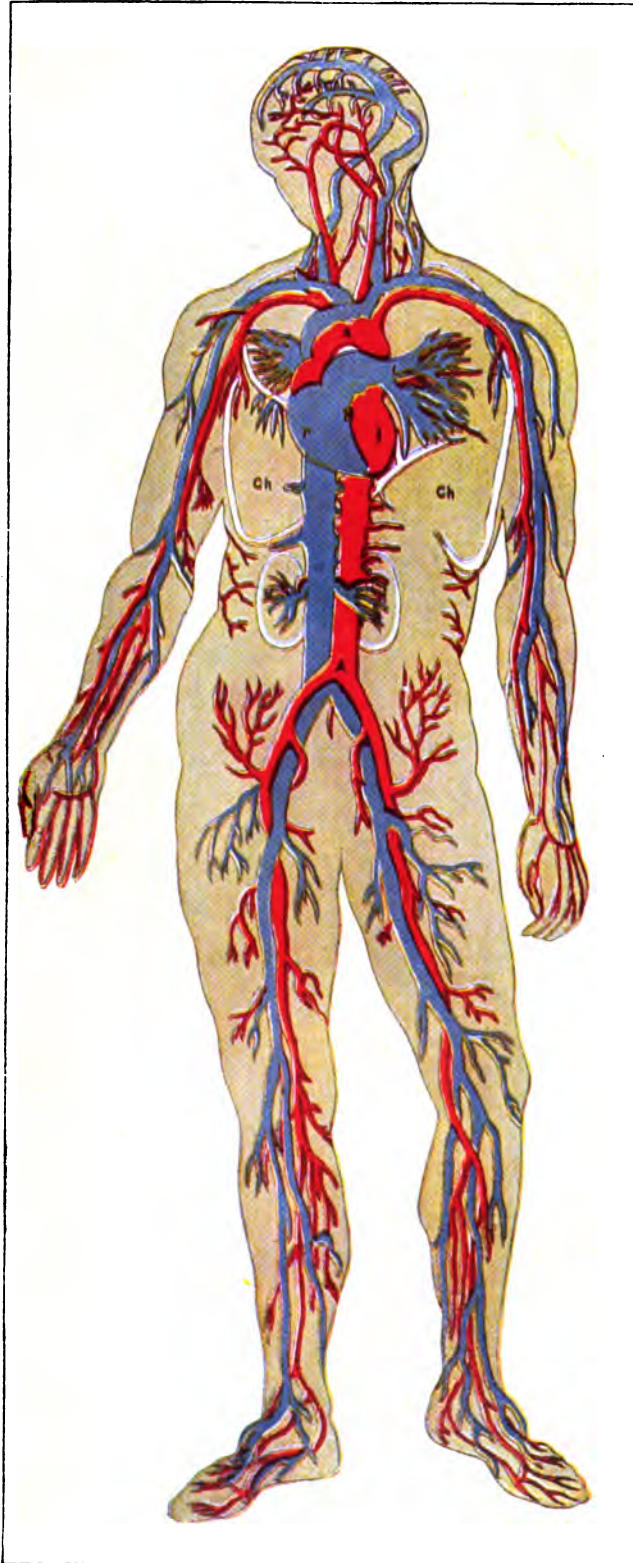
Blood, Council of, the name popularly applied to the Council of Troubles, established by the Duke of Alva, in the Netherlands, in 1567. Although it had no charter or authority from any source, it was omnipotent and superseded all other authorities. In the first three months alone its victims numbered 1,800, and soon there was hardly a Protestant house in the Netherlands that had not furnished a victim.

Blood Diseases. Many disorders are classed under this head. See ANÆMIA; BLEEDING; CHLOROSIS; CIRCULATION; HÆMOPHILIA; LEUCÆMIA; PERNICIOUS ANÆMIA.

Blood Feud, the right of individual, or family, vengeance in cases of bloodshed. In a very primitive state of society the tendency toward private instrumentality in the punishment of crime is largely unchecked. In passing from this stage to the highly organized system of legal penalties enforced by modern

BLOOD.—THE GENERAL DISTRIBUTION OF THE BLOOD VESSELS.

Arteries are shown in red, the veins in blue.



H, the heart. l, left side. r, right side. Arising from the heart is the main artery, Aorta (A). The letter is put on the vessel at some distance from the heart, near where it gives off the branches (in red) for the head and arms, and at the point where it arches backwards and downwards to pass through the chest and the belly till at A, it gives off branches for the legs. Running alongside the arteries are represented in blue, veins. At K, is represented the position of the kidneys and their veins. L, represents veins of the lung. J, jugular vein. Ch. outlines of the chest.

BLOOD-FLOWER — BLOOD-RAIN

civilized governments, the regulation of the blood feud was a marked step in the advancement of the race. It is true that the right of private vengeance was recognized, but it was put under restrictions and gradually narrowed in its action. The slayer had the right of sanctuary, illustrated by the cities of refuge in Israel under the Mosaic economy, by the altars of pagan deities and by the churches of the Middle Ages. The danger of dragging entire clans into retributive warfare to avenge a single murder was averted by limiting the right of vengeance to the immediate family, or the next of kin to the one slain, and the privilege of purchasing exemption by the weregild tended to check a blood penalty. The acceptance of the blood-money was finally made obligatory. The amount of the fine imposed upon the murderer varied among the Anglo-Saxons according to the rank of the victim. The family feuds among the mountain whites in certain sections of the United States form an interesting modern instance of the survival of the primitive institution of blood feud. See ASYLUM, RIGHT OF.

Blood-flower, or **Blood-lily**, a genus (*Hemantthus*) of about 60 species of summer- and autumn-blooming bulbous-rooted plants of the natural order *Amaryllidaceae*, natives mostly of South Africa, named from the general color of their flowers, which are arranged in umbels arising on an often beautifully colored scape either before the foliage or from a rosette of radical leaves. The few species cultivated in American greenhouses have not become widely popular, but are worthy of more extended culture, since the individual flowers are often two inches in diameter and the umbel sometimes a foot across. They may be cultivated like the nerine. Since some of the most attractive species reproduce slowly, the bulbs are often cut in two horizontally and treated like hyacinth bulbs similarly cut. Several new bulbs form around the margin of the cut halves. Consult Bailey and Miller, 'Cyclopedia of American Horticulture' (1900-2).

Blood Indians, or **Kino Indians**, a tribe of North American Indians of the Siksika Confederacy, dwelling in the Northwest Territories of Canada.

Blood-letting. See BLEEDING.

Blood-lily. See BLOOD-FLOWER.

Blood-money, money paid to the next of kin of a man who met with his death at the hands of another, accidentally or with premeditation. The Greeks called it *rowa*, the Latins *pana*, the Franks, Allemanni, and Scandinavians *manbote*, *wehrgeld*, or *wyrgilt*, the British Celts named it *saarhard*, and the Irish Celts *eric*. The institution still flourishes in many communities of Asia and Africa. In English criminal law the term blood-money was also applied to rewards paid to informers against highway robbers, thieves, burglars, and utterers of false coin or forged banknotes. Laws empowering such payments were passed between 1692 and 1742. In 1813 the total amount paid in this way was £18,000. By this time a number of persons made a living out of these laws by entrapping unwary and foolish people into the commission of the

crime of forging or uttering false coin, and then informing against them. As early as 1756 one McDaniel had brought to the scaffold and earned the blood-money of no less than 70 victims. Parliament, recognizing the abuses the system had engendered, repealed all the laws relating thereto, except in relation to the forgers of bank-bills, in which case the informer can still get his pecuniary reward.

Blood-pheasant, one of the small quail-like pheasants of the Himalayan genus *Ithaginis*, whose throat and breast are blood-red.

Blood-poisoning. From the standpoint of bacteriology blood-poisoning may be of two distinct types: It may be due to the presence of the poisonous toxins taken up by the blood, in which case it is called bacteriæmia or sapræmia, sometimes septicæmia; or it may result from the toxins plus the micro-organisms in the blood itself, a true blood infection, in which case it is termed, septicæmia, or pyæmia. The bacteria most frequently found in the blood in cases of septicæmia or pyæmia are the *Streptococcus pyogenes aureus*, *Staphylococcus pyogenes aureus*, *Diplococcus lanceolatus*, in pneumonia, *Bacillus typhosus*, in typhoid, and occasionally others. See PYÆMIA.

Blood Pressure. The pressure of the circulating blood varies very markedly in the three great divisions of the vascular system, the arteries, capillaries, and veins, being lowest in the latter, highest in the arteries, and intermediate in the capillaries. The arterial pressure is the most important from the practical standpoint of the physician, and depends on four factors: the strength of the heart's pulsations, the degree of peripheral resistance, the elasticity of the arterial wall, and the volume of the circulating blood. Although subject to not inconsiderable fluctuations, the arterial pressure during health is fairly constant, and in disease its study is of great importance, both for purposes of diagnosis and of treatment. In a general way its variations may be estimated by feeling the pulse and judging the pressure by the resistance of the artery to the fingers, but it has been found of value to make more accurate observations by means of special instruments, or sphygmomanometers. Numerous forms of these are in use, among the newer ones being Gärtner's tonometer, and the various modifications of the Riva-Rocci instrument devised by Cook, Stanton, and Janeway. Elevations of arterial tension are commonly observed in certain diseases of the heart, arteries, and kidneys; while the pressure is low in wasting diseases, after severe hemorrhage or grave injuries, and with impending death. The blood pressure may also be raised or lowered by the administration of appropriate drugs. (See CIRCULATION.) Consult Janeway, 'The Clinical Study of Blood Pressure' (New York 1904).

Blood-rain, showers of grayish and reddish dust mingled with rain, which occasionally fall, usually in the zone of the earth which extends on both sides of the Mediterranean westwardly over the Atlantic and eastwardly to Central Asia; the red color being due to the presence of a red oxide of iron.

BLOOD-STAINS — BLOODY SHIRT

Blood-stains, in medico-legal investigations, are subjects of some importance, particularly when murder is suspected and so-called blood-stains are to be investigated. The first question to be determined, is whether the suspected stain is blood of any animal; secondly, is it human blood or that of a lower animal. To determine the first question certain tests have been devised. These are (1) the guaiac test, by which blood brought in contact with tincture of guaiac and hydrogen peroxide develops a blue color (not, however, conclusive); (2) the hæmin test, by which crystals are produced from the hæmoglobin and identified under the microscope; (3) the spectroscope test, which gives a spectrum of hæmoglobin; (4) the microscope test, by which the blood-corpuscles are identified. To answer the second question requires either (1) the microscopical examination that determines the size, shape, and qualities of the blood-corpuscles; or (2) a much more reliable serum test, by which human serum, if brought in contact with the blood of an alien animal, causes dissolution of the blood-corpuscles of that animal's blood. By this serum test it is possible to detect any blood of any animal.

Blood-transfusion. See INFUSION; TRANSFUSION.

Blood-vessels. See ARTERIES; CAPILLARIES; HEART-VEINS.

Blood of Our Saviour, an order of knighthood, known also as the Order of Our Redeemer, and the Precious Blood of Jesus Christ. It was instituted in Mantua, Italy, in 1608, by Duke Vincenzo Gonzaga, and consisted of 20 members. Upon the collar was the legend *Domine probasti me*, and on the pendant, *Nihil isto triste recepto*.

Bloodbird, a black honey-eater of southern Australia, whose head, neck, breast, and back (of the male) are scarlet red.

Bloodhound, a dog of the "hound" build, commonly used for tracking fugitives. It usually stands from 25 to 27 inches high at the shoulders and weighs about 90 pounds. In appearance it is of a sedately noble expression, with a wise-looking, wrinkled face. Its color is black, mingled with a rich tan on the legs; a few are all tan. Its coat is short and glossy; the ears large and pendant; and the eyes deeply sunken, and showing a third lid or "haw." It has a somewhat loose skin for so muscular a dog, and quite a dewlap in front of the throat. It has a wonderful power of scent, by means of which, aided by judicious training, it is enabled to follow the footsteps of a particular man, though they may be crossed and recrossed a thousand times by other footsteps, and though they lead over bare pavements.

The true bloodhound suffers from an unfortunate name, which seems to suggest bloodthirstiness, a quality very far removed from his real disposition. The term "bloodhound" originally meant simply that the dog was thoroughbred in the same sense that a horse or other animal is of "blood" or "blooded" stock. In the early days the Spaniards introduced into Cuba and South America dogs which had some of the character-

istics of the bloodhound, but were really a cross between the ferocious war-dog of the ancients and the big Spanish pointer. These dogs had evil dispositions and were capable of great ferocity, and their sins have been visited on the real but innocent bloodhound. The true bloodhound will trail a man to the last of its strength, but will not voluntarily attack him. When it has located him, it will keep guard and prevent his escape; and may, if attacked, use its great powers in self-defense, but not in the savage manner generally attributed to it; it is not in its nature to be cruel.

Bloodroot. See SANGUINARIA.

Bloodstone. See HELIOTROPE; HEMATITE.

Bloodworm, the larvæ of species of *Chironomus*, gnats allied to the mosquito. The worms live in fresh-water pools and sluggish streams. They are long, slender, and worm-like, and certain species are blood-red in color. The flies have very feathery antennæ and do not bite. The larvæ usually have no tracheæ. The red color of these larvæ is due to hæmoglobin, a substance that has the power of attracting and storing oxygen, and giving it off to the tissues as they require it. Such larvæ are able to live in burrows which they construct in the mud. Some of them, provided plentifully with hæmoglobin, are in consequence able to live at great depths (it is said even at 1,000 feet in Lake Superior), and come to the surface only occasionally. A few are able even to tolerate salt water, and have been fished up from considerable depths in the sea. It is a remarkable fact that these physiological capacities differ greatly within the limits of the one genus, *Chironomus*, for some of these species are destitute of hæmoglobin, and have to live near the surface of the water; in these there is a well-developed tracheal system.

Bloodwort. See SANGUINARIA.

Bloody Assizes, the name given by the people to a series of trials held in England by the infamous Judge Jeffreys, in 1685, after the suppression of the Duke of Monmouth's rebellion. Upward of 300 persons were executed after short trials; very many were whipped, imprisoned, and fined; and nearly 1,000 were sent as slaves to the American plantations. See JEFFREYS, GEORGE.

Bloody Bill, in American politics, an act sometimes called the FORCE BILL, passed by Congress 2 March 1833. Its aim was to enforce the tariff-law of 1832, which the legislature of South Carolina had declared null and void. See U. S., TARIFF IN THE.

Bloody Falls, the lowest cataract of the Coppermine River in the Northwest Territories of Canada; so named because of a massacre here of Eskimos by Chippewa Indians in 1770.

Bloody Mary, a popular designation of Mary, Queen of England, on account of the persecutions of the Protestants during her reign (1553-6).

Bloody Shirt, a term used about 1880 in Congress, to revive the memories of the Civil War by impassioned allusions as, "to wave the bloody shirt."

BLOODY TOWER—BLOOMFIELD-ZEISLER

Bloody Tower, a term popularly applied to that portion of the Tower of London in which Richard III. is alleged to have caused the murder of his nephews, Edward V. and the Duke of York.

Bloom, the powdery or waxy protective film upon fruits, as grape and plum; and upon leaves and stems, as cabbage. It is especially noticeable upon desert plants. See also XEROPHYTES.

Bloom, a lump of puddled iron, which leaves the furnace in a rough state, to be subsequently rolled into bars or other form into which it may be desired to convert the metal. Also a lump of iron made directly from the ore by a furnace called a bloomery. See also *IRON*.

Bloomer, Amelia Jenks, American reformer; b. Homer, N. Y., 27 May 1818; d. Council Bluffs, 30 Dec. 1894. She was married in 1840 to Dexter C. Bloomer, of Seneca Falls, N. Y., where for several years she and her husband were engaged in publishing a semi-monthly periodical. In 1849 she began publishing 'The Lily' in the interests of temperance reform and women's rights; in 1853, on removing to Mount Vernon, Ohio, she resumed its publication there, and also became associate editor of 'The Western Home Journal.' In 1855 the couple removed to Council Bluffs, Iowa, where Mr. Bloomer became an organizer of the Republican party in that State, and a Federal official and a judge. She carried on her reformatory work for many years. Mrs. Bloomer will be remembered longest because of her personal adoption and her active advocacy of a costume which had been devised by Mrs. Elizabeth Smith Miller, and which became more popularly known as the Bloomer costume. (q.v.)

Bloomer Costume, a style of dress introduced about the year 1849 by Mrs. Amelia Jenks Bloomer (q.v.), who proposed thereby to effect a complete revolution in female dress and add materially to the health and comfort of her sex. It consisted of a jacket with close sleeves, a skirt reaching a little below the knee, and a pair of Turkish pantaloons secured by bands around the ankles. Though adopted rather extensively in America, it was unable to hold its ground against the united strength of prejudice and ridicule, and abroad it scarcely made further way than furnishing a favorite subject of burlesque on the stage, and of ridicule in the pages of the comic papers. One or two "strong-minded" women who ventured to brave public opinion in London by donning the new costume, were persecuted by the mob.

Bloomfield, Joseph, American soldier: b. Woodbridge, N. J.; d. Burlington, N. Y., 3 Oct. 1823. When the Revolutionary War broke out he was studying law, but joined the cause of the colonists with enthusiasm. In 1776 he received a captain's commission in the 3d New Jersey regiment, served with distinction throughout the war, and was mustered out a major. Resuming his legal studies, he acquired a successful practice in Burlington, was elected attorney-general, and twice (1801, 1812) governor of the State. During the War of 1812 he commanded a brigade. From 1817 to 1821 he was a representa-

tive in Congress, and as chairman of the Committee on Revolutionary Pensions he reported the bill granting pensions to soldiers of the Revolutionary army. In 1793 he was appointed a trustee of Princeton, and during his eight years' membership of the board, did much to promote the interests of that college.

Bloomfield, Maurice, American educator: b. Bielitz, Austria, 23 Feb. 1855. He came to the United States in 1857; entered the University of Chicago, and was graduated at Furman University, in Greenville, S. C., in 1877; took a course in Sanskrit and comparative philology in Yale College 1877-8; and was a Fellow of Johns Hopkins University 1878-9. He continued his studies in Berlin and Leipsic 1879-81; became an associate in Johns Hopkins University in 1881; and subsequently professor of Sanskrit and comparative philology there. He published numerous grammatical and philological papers; edited for the first time from the original Sanskrit MSS. the 'Sutra of Kauçika'; translated the 'Atharva-Veda' in the 'Sacred Books of the East'; and has since been engaged in compiling a 'Concordance of the Vedas.'

Bloomfield, Robert, English poet: b. Hoxington, 1766; d. August 1823. He learned to read at the village school, and in 1781 was sent to learn the trade of a shoemaker with his brother in London. The visiting of several places of worship, a debating society, Covent Garden Theatre, and the reading of sundry books, called forth his faculties, and he became almost unconsciously a poet. Hearing him one day repeat a song which he had composed, his astonished brother prevailed on him to offer it to the 'London Magazine,' and it was accepted. The piece was called 'The Milkmaid.' A second, 'The Sailor's Return,' likewise found a place in that journal. Thomson's 'Seasons,' 'Paradise Lost,' and other works of this kind, now became the subjects of his constant study. In the country, where he resided for a short time in 1786, he first conceived the idea of his poem, 'The Farmer's Boy,' which is characterized by a spirit of rural simplicity and innocence. It was written under the most unfavorable circumstances, in a garret. It was first shown to Capel Lofft in 1798, who was so much pleased with it that, in conjunction with his friend Hill, he had it printed in 1800. Bloomfield was patronized by the Duke of Grafton, who bestowed on him a small annuity and made him an under-sealer in the seal-office. This situation he was forced to resign on account of ill health. He then worked again at his trade as a shoemaker, and employed himself in constructing Æolian harps. Engaging in the book trade he became a bankrupt, and in the latter part of his life was afflicted with violent headaches and became nearly blind. He was gradually reduced to such a state of nervous irritability that apprehensions were entertained of his becoming insane. These fears were terminated by his death.

Bloomfield-Zeisler, Fanny, American pianist: b. Bielitz, Austrian Silesia, 16 July 1866. She came to Chicago with her parents in her second year, and at an early age displayed marked musical talent, which was later developed by study abroad, chiefly under Leschetizky at Vienna. Since 1895 she has played regularly in the principal cities of the United States. In

BLOOMFIELD—BLOUNT

1893-5 she made a tour of the chief cities in Germany, everywhere meeting with great applause. In the spring of 1898 she made a successful English tour.

Bloomfield, N. J., a township in Essex County, on the Delaware, L. & W., and the Erie R.R.'s, the Morris Canal, and trolley lines connecting with Newark, the Oranges, Jersey City, and other cities; 10 miles northwest of New York. It was founded in 1685, under the name of Watsessing, and received its present name from Gen. Joseph Bloomfield in 1796. The oldest church in the town dates from this year. Bloomfield once ranked as an educational centre. Here were located in addition to other similar institutions, the Bloomfield Classical School, Madam Cooke's Female Seminary, and a Presbyterian Theological Seminary, the edifice of the latter being now occupied by a German theological seminary. It has a fine Mountainside Hospital; contains the residences of many New York business men; and is engaged in the manufacture of church and cabinet organs, woolen goods, hats, shoes, rubber goods, tissue and photographic paper, saddlery, hardware, electric elevators, and a variety of brass goods. It has a national bank, daily and weekly newspapers, an assessed property valuation of nearly \$4,000,000 and a total debt of about \$250,000. Pop. (1910) 15,070.

Bloomington, Ill., city and county-seat of McLean County, situated near the geographical centre of the state, 126 miles south of Chicago and on the Illinois Central, Chicago & Alton, Big Four, and Lake Erie & Western R.R.'s.

Manufactures and Industries.—Bloomington is in the heart of the famous Illinois corn belt, surrounded by one of the richest and most productive agricultural sections in the world, and where the largest nurseries in the state, comprising over 1,000 acres, are located. It is engaged in the manufacture of farm implements, flour and feed, stoves and furnaces, brick and tile, canned goods, harness, store fixtures, and portable elevators; has a coal shaft lifting 700 tons of coal per day, a bevel glass plant, ornamental iron works, paper and cigar factories, a brewery and a pork-packing establishment.

Banks.—There are seven banks—three national and four state—with a combined capital and surplus of \$1,700,000, and deposits of \$5,000,000.

Parks.—The city has three beautiful parks and is noted for its fine brick pavements, having more than any other city of its size.

Churches, Educational Institutions, Etc.—There are 32 churches of all denominations, a fine public school system, with a high school, 12 grammar schools, 3 parochial schools and several excellent private schools; a commercial college, a college of oratory and one of music. Bloomington has one of the largest and best selected public libraries in the state and several law libraries. The Illinois Wesleyan University (q.v.) and the Soldier's Orphan Home are located here, and the Illinois State Normal University (q.v.), which has long been known as one of the best institutions in the Union for the education of teachers, is situated at Normal, a suburb about two miles distant from the courthouse, and connected by electric railway. Among the public buildings are a large court-house, two opera-houses, and several commodious public halls.

History, Government, Etc.—The city was first settled by pioneers from New England and Kentucky and became a borough in 1831 and was incorporated in 1851. The government is vested in a mayor and board of aldermen, composed of 14 members, who are elected biennially. The city has an electric railway system, operating over 20 miles of track, and a well-trained fire department; is lighted by gas and electricity and controls its water-works. Pop. (1910) 25,768.

ADLAI E. STEVENSON.

Bloomington, Ind., city and county-seat of Monroe County, on the Monon and the Indianapolis Southern R.R.'s; 60 miles south of Indianapolis. It is in a limestone and quarry region; is the seat of the Indiana State University (q.v.); and besides its farming and quarrying interests has important manufacturing concerns, especially in the lines of leather and hardware. The city has the Monroe County Library, a national bank, several daily and weekly periodicals, and a property valuation of over \$1,500,000. It was settled in 1818 and was incorporated as a city in 1876. Pop. (1910) 8,838.

Bloomsburg, Pa., a town and county-seat of Columbia Co.; on the Susquehanna River, the Pennsylvania Canal, and several railroads; 40 miles west of Wilkesbarre. It is in an iron and limestone region; contains a number of iron furnaces and foundries, silk mills, brass and copper tube works, furniture and desk factories, carpet factories, etc.; is the seat of the State Normal School and a literary institute, and has an assessed property valuation of about \$2,500,000. Pop. (1910) 7,413.

Blouet, Paul, pôl bloo-â (MAX O'RELL), French lecturer and author: b. Brittany, France, 2 March 1848; d. Paris, 24 May 1903. In early life he was an officer in the French army, but in 1873 went to England and became a teacher. After the publication of his first book, 'John Bull and His Island' (1883), he abandoned teaching and devoted himself to literature. His works include 'John Bull and His Daughters' (1884); 'Jonathan and His Continent' (1888, with Jack Allyn); 'A Frenchman in America' (1891); 'John Bull & Co.' (1894).

Bloundelle-Burton, John Edward, English novelist: b. 3 March 1850. He was educated for the army, has lived and traveled in the United States and many European countries and has been a correspondent of various English and French journals. His published works include: 'The Silent Shore' (1886); 'His Own Enemy' (1887); 'Across the Salt Seas' (1898); 'The Scourge of God' (1898); 'Fortune's My Foe' (1899); 'A Bitter Heritage' (1899); 'The Seafarers'; 'Servants of Sin' (1900); 'A Vanished Rival' (1901); 'The Year One' (1901); 'The Fate of Valsee' (1902).

Blount, James H., American legislator: b. Macon, Ga., 12 Sept. 1837; d. 8 March, 1903. He first came into public notice in 1865, when, after having served in the Confederate army he was a delegate to the Georgia constitutional convention. Thereafter he devoted himself to the practice of law until 1872, when he was elected to Congress from the Sixth District of Georgia. He held his seat by successive re-elections till 1893, when he declined a further term. As he finished his last term the House paid him the unusual honor of suspending its proceedings to give the members an opportunity to testify to

BLOUNT--BLOWING MACHINES

their appreciation of his worth. In his last term he was chairman of the Committee on Foreign Affairs, and his familiarity with American relations with other countries led President Cleveland to appoint him commissioner paramount to Hawaii in March, 1893, for the purpose of investigating the deposition of the royal government and the establishment of the American protectorate over the kingdom. On his arrival in Honolulu he at once caused the American flag to be hauled down from the Provisional Government House, and the United States marines to be withdrawn from the locality. This proceeding led to considerable excitement in the United States; the withdrawal of United States Minister Stevens from Honolulu; the appointment of Commissioner Blount as his successor; and a renewal both in Washington and Honolulu of the agitation for the annexation of Hawaii to the United States. On the completion of his mission Minister Blount retired to his large Georgia estates. See HAWAII.

Blount, William, American statesman: b. North Carolina, 1754; d. Knoxville, Tenn., 21 March 1816. He was a delegate from his native State to the Continental Congress in 1782, 1783, 1786, and 1787; a signer of the Federal Constitution in 1787, and governor of the territory south of the Ohio (1790). In 1796 he was chosen president of the Convention of Tennessee, and was elected the same year by that State to a seat in the U. S. Senate. But in 1797 he was expelled from that body for having, as it was alleged, instigated the Creeks and Cherokees to assist the British in conquering the Spanish territories near the United States. His impeachment merely served to increase his popularity at home, where he was promptly elected a member of the State Senate and chosen president thereof.

Blow, John, English musical composer: b. 1648; d. 1708. He became organist of Westminster Abbey at the age of 21, and in 1676 also organist of the Chapel Royal, and obtained the degree of Doctor of Music. In 1680 he resigned his post in Westminster Abbey to his pupil Purcell. In 1699 he was appointed composer to the Chapel Royal. He was a voluminous composer, but many of his works have never been printed. Among his sacred pieces are upward of 100 anthems, 14 church services, and various other compositions. A number of his secular compositions for one, two, or three voices, with accompaniment, were published under the name of 'Amphion Anglicus.'

Blow-fly, a common fly belonging to the family *Muscidae*. It is the large, noisy fly which enters houses, and was named *Calliphora vomitoria* by Linnaeus. It is black on the head and thorax, while the abdomen is steel-blue. It is similar to the flesh-fly in habits; but instead of living larvæ it deposits its eggs which are long and cylindrical, in stacks ('fly-blows') on meat, cheese, etc. The larvæ hatch in 24 hours; they become fully grown in probably five or six days, and transform into pupæ enclosed by a brown shell (puparium), formed by the drying and contraction of the larval skin. Oily or greasy substances are avoided by them, and by all other flies, and a cloth dipped in kerosene oil and suspended in a room will keep them from entering it. Another blow-fly is *Calliphora*

erythrocephala, common to Europe and North America.

Blowgun, a weapon formerly used by the Indians inhabiting the shores of the Gulf of Mexico and still employed by some of the Indian tribes of South America, both in war and for killing game. It consists of a long, straight tube in which a small poisoned arrow is placed, and forcibly expelled by the breath. The tube or blowgun, called *gravatana*, *puncuna*, etc., is 8 to 12 feet long, the bore not generally large enough to admit the little finger. It is made of reed or of the stem of a small palm. A sight is affixed to it near the end. The arrows used are 15 to 18 inches long, made of the spines of another palm, sharply pointed, notched so as to break off in the wound, and their points covered with curari poison. A little soft down of the silk-cotton tree is twisted round each arrow, so as exactly to fit the tube.

Blowing Machines. The term blowing machine or blower is applied to various forms of mechanical arrangements employed for the production of artificial currents of air for ventilating purposes, for forced draught for furnaces, etc. They are also employed as exhausters for the removal of smoke and fumes from smelting works, foundries, etc., for the removal of sawdust and wood planings from saw mills and planing mills, and for handling such material as emery, coffee, metal filings, etc.

The various forms of blowers may be conveniently divided into the following general classes:

Bellows.—These comprise the earliest forms of blowing machines and are also the most familiar at the present time. In their earlier forms, still used in some oriental countries, they consisted of simple bags of skin each equipped with a valve and nozzle. A more elaborate application of the same principle is found in the ordinary domestic bellows and those used in the blacksmith's shops. The only point of interest in this connection is the means employed to maintain a continuous blast. This is accomplished by introducing a third board between the upper and lower boards of the ordinary bellows. The middle board is fixed or arranged to remain stationary. This board and the lower board are provided with valves which open inwardly. A weight attached to the lower board keeps the lower chamber filled with air, so that when the lower board is raised by means of a lever or some similar arrangement, the air in the lower chamber is forced into the upper chamber. The outlet nozzle is attached to the upper chamber, and the upper board is sufficiently weighted to press the air out through the nozzle in a continuous stream, which is maintained by the relatively large quantity of air which is always present in the upper chamber under the uniform pressure of the weighted board. It is obvious that a spring can be used instead of a weight to press out the air from the upper chamber, and this arrangement is the one usually employed in the case of the bellows ordinarily used in blacksmith's shops.

Piston Blowers.—The simplest form of a piston blower consists of a square wooden chamber with a close fitting piston working within it. When the piston is drawn backward, air is sucked into the chamber through a flap

BLOWING MACHINES

valve, and when the piston is pushed forward this air is compressed and forced out through the nozzle.

Blowing-Engines.—The air pump or air compressor used for producing low pressures represents the modern form of piston blowers. Various types of these machines are extensively used for supplying the air blast to the cupolas of blast furnaces, Bessemer converters, etc. They are driven by either steam, gas, or water power, and are then commonly known as blowing-engines. A machine of this type usually consists of a power cylinder operating a piston either by steam or gas, and an air compressor cylinder which delivers the compressed air into the blast pipes. In the horizontal engines, the two cylinders are placed tandem to each other with the compressor cylinder in front. In the vertical engines, the compressor cylinder is

developing as high as 7,000 horsepower are being built both in the United States and in Europe for this purpose. See GAS ENGINES.

Rotary Blowers.—This type of machines includes various forms of disk blowers and fans which are generally used for ventilating purposes. See COAL MINING MACHINERY.

The disk blowers are built in sizes ranging from one to ten feet in diameter, and are capable of delivering from 1,000 to 250,000 cubic feet of air per minute, according to their size and the number of revolutions per minute at which they are operated. The accompanying table of capacities of open air delivery, gives some normal values relative to the size of the disks, the speed at which they are run, the cubic feet of air propelled per minute, and the horsepower required to operate them.

Disk blowers are often called fans, but it is

TABLE OF OPEN-AIR DELIVERY CAPACITIES.

Velocity of air in ft. per min.	Cu. ft. R.P.M. B.H.P.	Diameter of fan in inches												
		18	24	30	36	42	48	54	60	72	84	96	108	120
750	Cu. ft.	1,478	2,620	4,116	5,830	8,081	10,550	13,874	16,489	23,474	30,823	56,218	58,564	66,444
	R.P.M.	418	300	250	200	175	150	135	125	100	100	100	70	65
	B.H.P.	.08	.06	.10	.15	.20	.24	.40	.39	.60	.90	1.17	1.50	1.70
1,100	Cu. ft.	1,912	3,956	6,615	8,895	12,121	15,826	20,024	24,784	35,620	51,984	64,927	89,150	98,910
	R.P.M.	620	450	400	300	260	225	200	175	150	150	125	100	100
	B.H.P.	.06	.14	.22	.38	.48	.60	1.00	.95	1.40	2.00	2.38	4.00	5.00
1,600	Cu. ft.	2,640	5,275	8,232	11,861	16,162	21,100	26,712	34,378	47,494	64,646	84,437	112,420	131,938
	R.P.M.	850	600	500	400	350	300	275	250	200	175	150	150	125
	B.H.P.	.10	.36	.40	.66	1.00	.96	1.90	2.10	2.50	4.00	4.75	7.50	7.90
1,875	Cu. ft.	3,300	6,594	10,200	15,885	20,202	28,376	34,790	41,223	59,367	81,144	109,748	134,960	164,990
	R.P.M.	1,050	750	600	500	450	400	350	300	250	225	200	175	150
	B.H.P.	.20	.50	.72	1.10	1.67	2.25	3.20	3.50	3.95	7.50	10.50	11.25	12.00
2,500	Cu. ft.	4,400	8,792	13,720	20,230	26,036	34,168	44,520	54,964	79,156	107,744	140,728	178,080	219,940
	R.P.M.	1,400	1,000	800	700	550	500	450	400	350	300	300	225	200
	B.H.P.	.75	1.00	1.40	2.25	3.30	4.00	4.50	6.00	7.00	10.00	18.50	20.00	28.00

Cu. ft. Cubic feet of air delivered per minute.
R.P.M. Revolutions per minute.
B.H.P. Brake horsepower required to operate fan.

usually placed on top of the power cylinder. The pistons of both cylinders are carried on a common piston rod, and the engines are usually provided with heavy flywheels to insure steady operation.

In many forms of steam blowing-engines, the power cylinders are compounded, while those of gas engine installations are often made double-acting, and sometimes two power cylinders placed tandem to each other and to the compressor cylinder are successfully employed.

The recent discovery of the suitability of blast furnace gas, i. e. the gas which passes out of the top of blast furnaces employed for the smelting of iron ores, has greatly tended towards the development of large gas engines specially adapted for blowing purposes. Up to the year 1900, the largest engine of this type was a Cockerill engine of about 600 horsepower, but since then, the capacities of these machines have been greatly increased, and engine units

well to understand, that in the former the blades are set at an angle to the axle while in a fan blower proper, the blades are set parallel to the axle on radial spokes in a manner similar to the setting of the paddles on a paddle wheel. These blades may be either flat or curved in both cases, and are arranged to revolve in a steel or cast iron casing or shell so designed that the air is sucked in through a larger or smaller orifice at the side and forced out through an outlet leading from the periphery.

The ordinary pressure blowers are merely another form of fan blowers. They were originally designed for use with cupola furnaces, and forges, but are also extensively used for producing mechanical draught for the furnaces of boilers, for use with mechanical stokers, sand blast machines, pneumatic tube delivery systems, etc., or for any work requiring pressures as high as 16 ounces per square inch.

The fan wheels are usually made of thin

BLOWING MACHINES

galvanized steel, and are enclosed in a shell of cast iron. The larger sizes are usually provided with two driving pulleys, and are usually made to discharge horizontally at the bottom, but they can be built in any other of the four right angles. See Fig. 1.

Positive Blowers.—These machines are a more recent form of the rotary blowers, and are very extensively used for operating high pressure forges, blow-torches, gas furnaces, low pressure sand blasts, small pneumatic tube systems, and similar purposes requiring a capacity ranging from 25 to 150 cubic feet of air per minute at a pressure ranging from four to eight ounces. They can be driven by direct connection engines and electric motors, or by power driven belting, and the principle of rotary motion applied to air under high pressure appears to eliminate a great deal of the incidental friction, so that when high efficiencies can be obtained they are preferable to fans and blowing engines.

These machines consist of an outside casing or cylinder of cast iron provided with massive head plates which carry the journal boxes as shown by Fig. 2, which illustrates a horizontal

water is forced into the impellers at one end through a hole drilled into the center of the shaft, and out at the other through a similar passage.

These machines will maintain a pressure ranging from seven to ten pounds per square inch. In some designs a spray of water is used to pack the machines so as to prevent the air from escaping backwards, and also for the purpose of absorbing the heat due to compression.

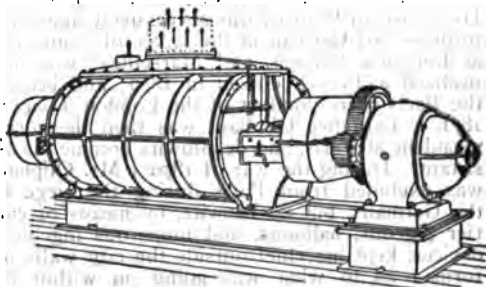


FIG. 2.—Positive Blower.

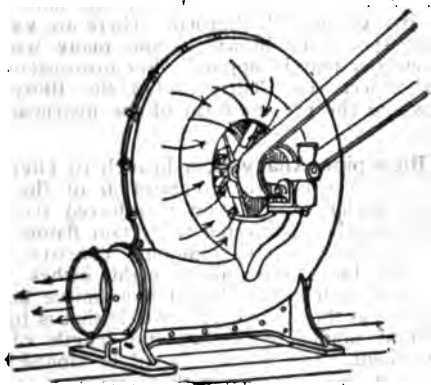


FIG. 1.—Pressure Blower.

blower geared to an electric motor on the same bed plate.

Within this casing, two impellers A and B, Fig. 3, revolve on horizontal shafts which are connected by gear wheels outside the casing, thus giving them an invariable relative motion. The contact surfaces of the impellers are formed on mathematically correct lines, and they revolve together with uniform clearance and without metallic contact either with each other or with the enclosing casing, thus preventing internal friction. There are no waste spaces between the impellers to cause the formation of air pockets, and no sharp corners or edges to produce sound vibrations, and as the impellers are symmetrical relatively to their shaft centers, they remain perfectly balanced at all speeds.

High Pressure Positive Blowers.—In this type, where the heat of compression constitutes an element of danger, the entire casing and journal boxes are water jacketed, and complete water circulation is maintained through the impellers and the casing during operation in order to prevent expansion under the temperatures due to the high pressures of compression. The

This water is carried over into a separating tank and drained off automatically. This method enables the attainment of an efficiency under high pressures fully as high as that attained under pressures ranging from three to four pounds.

In operating positive pressure blowers, it is generally estimated that 30,000 cubic feet of air are required to melt a ton of iron, and that under a pressure of one pound per square inch, an energy of five horsepower is required to deliver 1,000 cubic feet. These values form a fair basis for the calculation of the speed or capacity of a blower of this type for any desired purpose.

Jet Blowers.—These arrangements do not strictly belong to any class of blowing machines.

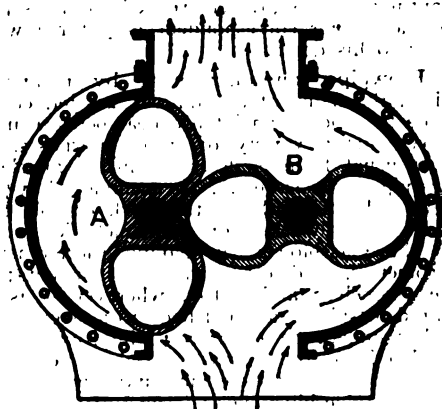


FIG. 3.—Cross Section Through Positive Blower.

They simply represent the utilization of a jet of steam or water to produce an artificial current of air. This is usually accomplished by forcing the jet of steam or water through a pipe of small diameter inserted in a pipe of larger diameter open at both ends, thus creating a current of air through the larger pipe in the

BLOWITZ—BLOWPIPE ANALYSIS

direction of motion of the jet. The steam-jet devices are represented by the exhaust nozzles used in the smokestacks of fire engines and locomotives. See HEATING AND VENTILATING.

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Blowitz, Henri Georges Stéphane Adolphe
Opper de, ön-ré zhörzh stä-fän äd-öf öp-pér
de blö-vitz, French journalist: b. Pilsen,
Austria, 28 Sept. 1832; d. Paris, 18 Jan. 1903.
He settled in France; was successively appointed
professor of German in the Lytée of Tours and
at Limoges, Poitiers, and Marseilles; was nat-
uralized a French citizen in 1870; and became
the Paris correspondent of the *London Times* in
1871. Laurence Oliphant was then the corre-
spondent at Paris, and de Blowitz became his as-
sistant. During the war of 1870-1 Mr. Oliphant
was excluded from Paris during the siege by
the Germans, but de Blowitz, by means of car-
rier pigeons, balloons, and numerous ingenious
devices, kept his chief outside the city walls in-
formed as to what was going on within the
beleaguered city. He was noted for his success
in obtaining secret and important information
long before it was ready for official promulga-
tion; and for his personal interviews with
Thiers, Bismarck, Comte de Chambord, Alfonso
XII, Gambetta, the Comte de Paris, the Sultan
of Turkey, Marquis Tseng, the King of Ruma-
nia, Leo XIII., Jules Ferry, Duclerc, Prince
Lobanoff and many other eminent men of the
time in Europe. Many of his disclosures in his
letters to the *Times*, such as the text of the
Treaty of Berlin, which he forwarded before
it had been signed, created much excitement
throughout Europe. He contributed more than
4,000 columns to the *Times*; was made an officer
of the Legion of Honor, an officer of the Insti-
tute of France, and doctor of philosophy. He
published 'Feuilles Volantes' (1858); 'L'Alle-
magne et la Provence' (1869); 'Le Mariage
Royal d'Espagne' (1878); 'Une Course à Con-
stantinople' (1884). He retired from his posi-
tion as *Times* correspondent only three weeks
prior to his death.

Blowpipe, an instrument by means of
which the flame of a candle, a gas-jet, etc., is
made to produce an intense heat, being then
employed for a variety of useful purposes. Its
most usual form is described in the article on
blowpipe analysis (q.v.). It is employed by jew-
elers and goldsmiths in the work of soldering,
and by other workers on small metallic objects;
by the glassblower in making thermometers,
barometers, and other glass instruments; by
the engraver; and indeed wherever it is re-
quired to subject a small body to a strong heat.
It has undergone a variety of improvements in
the hands of the chemist, to whose researches
it has proved an excellent auxiliary. Wollas-
ton's portable blowpipe is formed of three pieces
fitted into one another when in use, but which
may be taken down and made to slide within
each other. Most laboratory blowpipes have a
hollow bulb or enlarged part at or near the end,
the object of which is to condense the vapor
of the breath, which often proves injurious in
the common form of the instrument. To pre-
vent corrosion from the action of the moisture,
the bulb is made either of silver or sheet-tin,
and it is capable of being opened in order that

it may be more easily cleaned. A little prac-
tice is necessary to enable the operator to keep
up a constant blast for any length of time, the
current of air being propelled through the pipe
by the muscular exertion of the cheeks, while
respiration is carried on through the nose. But
when the process has to be long continued, the
current of air is supplied by bellows. This is
the form commonly used by glassblowers. The
gas blowpipe, commonly called the oxyhydrogen
blowpipe, is a very important and intensely pow-
erful variety, whose structure is due to Mr.
Newman of London. Sir Humphry Davy sug-
gested the employment of other gases instead
of common air, and Dr. Clarke of Cambridge
adopted the suggestion. Dr. Clarke found that
a mixture of two volumes of hydrogen and one
of oxygen produced the greatest effect. These
gases are contained in a bladder attached to the
end of a pipe which leads into a vertical cylin-
der, in which is fitted a piston, working through
a collar at the top. By the action of this piston
the gas from the bladder is compressed into
a copper chamber, and thence issues to the flame
through an ordinary blowpipe nozzle. To guard
against explosions, the gases are kept in separate
holders, and by means of a special kind of
burner are prevented from mixing until they
are about going to be burned. There are various
other species of blowpipe, and many uses to
which they may be applied. For information on
the subject see Plattner, 'On the Blowpipe'
to whom the present form of the instrument is
due.

Blowpipe Analysis, a branch of chemical
analysis in which the composition of the sub-
stance under examination is inferred from its
behavior when subjected to certain flame tests.
The blowpipe itself commonly consists of a
tapering brass tube about eight inches long,
provided with a bell-shaped mouthpiece at one
end, and at the other with a nozzle that is turned
at right angles to the general length of the
instrument. The nozzle should be tipped with
platinum, and provided with a very minute per-
foration through which the operator blows a tiny
blast of air that drives the flame of his lamp
against the object to be analyzed. The flame
used in blowpipe work should not be round
and colorless, like those of spirit lamps and
Bunsen burners, but should be flat and luminous,
containing plenty of free, incandescent carbon.
A large candle-flame serves very well, although
it is not flat. Usually a gas-flame is employed,
in connection with a burner formed by flatten-
ing a piece of brass tubing, and then cutting
it off at the top, at an angle. When the blow-
pipe is in service its tip is introduced into the
flame of the lamp, which the air-blast deflects
laterally in the form of a long, almost non-lumi-
nous cone, which consists of two visibly differ-
ent portions. The inner part is somewhat
brighter, and is richer in unoxidized gases. The
outer layer, being more plentifully supplied with
oxygen, consists almost entirely of completely
oxidized gases. The outer portion of the blow-
pipe flame is called the "oxidizing flame," since
this part, when directed against the specimen
under examination, heats it while it is in con-
tact with the air, and causes it to oxidize, if it
is capable of doing so at the temperature that is
attainable by the blowpipe. The inner portion
of the flame is called the "reducing flame,"

BLOWPIPE ANALYSIS

from the fact that when the specimen is exposed to this part, it is heated, not in contact with the air, but while surrounded with an atmosphere of partially unoxidized hydrocarbon gases. Under these circumstances many metallic oxides give up their oxygen to the hot hydrocarbon gases in which they are bathed, and are themselves reduced to the metallic form. If a flame still richer in free carbon and unconsumed hydrocarbons is desired, the tip of the blowpipe is held just outside of the lamp-flame, and a jet of flame with a luminous tip containing particles of solid carbon can easily be thrown down upon the specimen.

In blowpipe analysis there is no recognized "scheme" to be followed out. The method is oftenest used for the determination of minerals, and in such cases the analyst usually has some sort of idea, in advance, of the elements that may possibly be present. The substance to be examined is usually first pulverized, and a portion of it heated in a tube that is open only at the upper end. If it carbonizes, it contains organic matter of some kind, and the odor that is produced is often a good indication as to whether the organic matter is of an animal or vegetable nature. If the substance, when heated in the closed tubes, gives off water which condenses in the upper part of the tube, the moisture so condensed should be tested with litmus paper. If it is neutral, the substance is a hydrated compound, or a hydroxide. An acid reaction indicates acid salts, and an alkaline one may usually be taken to indicate the presence of compounds of ammonia. If the substance melts but does not change its color, it is an alkaline or a hydrated salt. If it melts and turns yellow, remaining yellow even after cooling, it contains oxide of bismuth; while if it melts to a yellow color, but turns red upon cooling, it contains oxide of lead. If it does not melt, but changes color, the indications are as follows: Yellow, both hot and cold, indicates stannic oxide; if yellow while hot, but white when cold, zinc oxide; if black while hot, and reddish-brown when cold, ferric oxide; if black while hot, but bright red when cold, mercuric oxide. If gas is evolved, its nature should be determined. Oxygen may be detected by the kindling of a glowing splinter of wood inserted into the tube; carbon dioxide by its extinguishing such a spark promptly; carbon monoxide by the gas burning with a bluish flame when ignited at the mouth of the tube; sulphur dioxide, ammonia and cyanogen, by the odor. Oxygen indicates chlorates, peroxides, etc.; carbon dioxide indicates carbonates or oxalates; carbon monoxide indicates oxalates or formates; sulphur dioxide indicates certain sulphites or sulphates; cyanogen indicates cyanides; and ammonia indicates some compound of that substance. If the gas is reddish-brown in color, bromides, nitrates, or nitrites, are probably present; if it is violet, an iodide is indicated. A sublimate may also be deposited upon the tube. If the sublimate is black, or nearly so, selenium or mercuric sulphide are indicated; if yellow, sulphur or a sulphide; if white, a salt of ammonia or mercury, a volatile organic acid, or an oxide of antimony or arsenic. Gray metallic globules indicate mercury, and a metallic mirror may represent either antimony or arsenic.

When the substance is heated in an inclined tube, open at both ends, similar indications are

to be observed; modified somewhat, however, by the fact that oxygen can now pass up through the tube and come in contact with the specimen under examination. Thus sulphides are commonly oxidized in the open tube, arsenic will sublime as the trioxide and not as the metal, and selenium gives a sublimate that may be gray or red, and also a strong odor of horseradish.

The color that the specimen communicates to the non-luminous part of the flame is likewise of great service in determinations by the blowpipe. A piece of platinum wire, bent at the end into a small loop, is dipped in hydrochloric acid and held in the flame, this process being repeated several times until the analyst is confident that the wire itself is free from any substance that can color the flame. The little loop at the end is then brought into contact with some of the finely pulverized specimen, and introduced into the flame again. Sodium gives a strong lasting yellow; calcium an orange red; lithium and strontium a crimson; potassium a lavender; barium an apple green; thallium, copper, and boric acid a brighter green; lead and antimony a pale blue; selenium a deep blue. The yellow due to sodium is so powerful, even when that metal is present only in slight amounts, that the colors due to the other metals present are sometimes difficult to observe by the unaided eye. Hence colored glasses are often used, through which to take note of the flame color; the tint of the glass being selected so as to cut off the yellow light of the sodium, while allowing the particular color that is sought to pass through unobstructed. Cobalt blue glass, for example, is used in this way in testing, by flame coloration, for potassium.

When a sample of the specimen to be analyzed is heated upon charcoal, it is often possible to obtain some of the elements that are present, in the form of a metallic bead, by the reduction of their oxides or of the other compounds in which they were originally contained. Lead, tin, and silver give beads that are white and malleable; copper gives a malleable red bead; antimony and bismuth give brittle beads; and iron, cobalt, and nickel may often be obtained in the form of gray, magnetic powders.

While the substance is being heated upon charcoal, an incrustation commonly forms on the charcoal, from the character of which useful inferences can be drawn. Thus antimony gives a white incrustation; bismuth, an incrustation that is deep yellow when hot and lighter yellow when cold; lead, one that is light yellow when hot and deep yellow when cold, and is surrounded by a white border; arsenic gives a white incrustation that is very volatile; and with zinc the color is yellow when hot and white when cold.

Many metallic oxides are soluble in melted borax, and valuable color indications are obtained by heating small quantities of the substance in little beads of melted borax, that are held in the flame upon tiny loops of platinum wire. The phenomena that are observed in this way are quite complicated, however, and for an account of them the manuals on blowpipe analysis should be consulted. See Cornwall, 'Manual of Blowpipe Analysis'; Moses and Parsons, 'Elements of Mineralogy, Crystallography, and Blowpipe Analysis'; Dana, 'Minerals and How to Study Them.'

BLUCHER

Blücher, Gebhard Leberecht von, geb'härt lä'be-rēht fōn blü-kēr (PRINCE OF WAHLSTADT, vāl'stāt), Prussian soldier: b. Rostock, 16 Dec. 1742; d. Krieblowitz, Silesia, 12 Sept. 1819. When 14 years of age he visited the island of Rügen, where the sight of some Swedish hussars aroused a desire to become a soldier, and in spite of the opposition of his parents and relatives he took service in a Swedish regiment as cornet. His first campaign was against the Prussians, and he was taken prisoner by the same regiment of hussars which he afterward commanded. The commander of this regiment, Col. von Belling, induced him to enter the Prussian service. An exchange was agreed upon with the Swedes, and Blücher was made lieutenant in Belling's regiment. Discontented at the promotion of other officers over his head, he left the army, devoted himself to agriculture, and by industry and prudence acquired an estate. After the death of Frederick II. he became a major in his former regiment, which he commanded with distinction on the Rhine 1793-4. Orchies, Luxemburg, Frankenstein, Oppenheim (16 Jan. 1794), Kirsweiler and Edisheim in the Palatinate, bear witness to his achievements. After the battle of Kirsweiler, in 1794; which added greatly to his reputation, he was appointed major-general of the army of observation stationed on the lower Rhine. In 1802, in the name of the king of Prussia, he took possession of Erfurt and Mühlhausen. On 14 Oct. 1806, he fought at the battle of Auerstädt. He then, with the greater part of the cavalry, followed the retreat of the Prince of Hohenlohe to Pomerania. His squadron, moving on the left of the main army, became separated from it, and the Prince of Hohenlohe was forced to surrender at Prenzlau. Blücher, cut off from Stettin by this accident, threw himself into Mecklenburg where he joined at Dambeck the corps of the Duke of Weimar, commanded by Prince William of Brunswick-Oels. All the troops, however, were too much fatigued to undertake any enterprise. Having the Grand Duke of Berg on his left flank, the Prince of Ponte Corvo in his front, and Marshal Soult on his right, Blücher was obliged to take post behind the Trave in order to draw off the three great divisions of the French forces from the Oder as long as possible. With this view he entered the territory of the free city of Lübeck, which was soon stormed by the French. Although Blücher escaped with some troops he was obliged to surrender at Ratkau on 6 November, but with a clause in the capitulation that he "accepted it only from want of ammunition, provisions, and forage." He was soon exchanged for the French general Victor, and on his arrival at Königsberg was placed at the head of a corps and sent to Swedish Pomerania to share in the defense of Stralsund and to assist the efforts of the Swedes. After the Peace of Tilsit he labored in the department of war at Königsberg and Berlin. He then received the chief military command in Pomerania, but at the instigation of Napoleon was afterward dismissed from the service. In the campaign of 1812, when the Prussians assisted the French, he took no part; but no sooner did Prussia rise against her oppressors than Blücher, already 70 years old, engaged in the cause with all his former activity. He was appointed commander-in-chief of the Prussian army and the Russian

corps under Gen. Winzingerode, which at a later period was separated from him. In 1813 he was created field-marshal. His heroism in the battle of Lützen (2 May 1813) was rewarded by the Emperor Alexander with the order of St. George. The battles of Bautzen and Hanau, those on the Katzbach (26 Aug. 1819) and Leipsic added to his glory. On the Katzbach Blücher defeated the army of Marshal Macdonald and delivered all Silesia. On 3 October Blücher crossed the Elbe at Wartenburg, and encouraged the Bohemian army under Schwartzberg, and the northern army under the crown-prince of Sweden, to act with more spirit. On 16 October he gained a signal advantage over Marshal Marmont at Möckern, forcing his way as far as the suburbs of Leipsic. On the 18th, in connection with the crown-prince of Sweden, he contributed greatly to the defeat of the enemy, and on the 19th his troops made the first assault upon Leipsic. His promptitude and peculiar manner of attacking had already procured him from the Russians the name of "Marshal Forward." On 1 Jan. 1814, with the Silesian army, which now consisted of two Prussian, two Russian, one Hessian, and one mixed corps, he crossed the Rhine at Kaub, took possession of Nancy on the 17th, gained (1 February), the battle of La Rothière, and pushed forward toward Paris. His detached corps were, however, checked by Napoleon; yet Blücher, though with a great loss, effected his retreat toward Châlons. He then crossed the Aisne at Soissons, joined the northern army, obtained (9 March) a victory over Napoleon at Laon, and, in connection with Schwartzberg, at the close of the month, pressed forward to Paris. The day of Montmartre crowned this campaign, and on 31 March Blücher entered the capital of France. For this triumph he was created Prince of Wahlstadt, with a suitable income. In England, whither he followed the allied monarchs in June of the same year, he was received with enthusiasm. The University of Oxford conferred on him the degree of Doctor of Laws. He then lived on his estates in Silesia till 1815, when the chief command was again committed to him, and he led his army into the Netherlands. On 15 June Napoleon threw himself upon him, and Blücher, on the 16th, was defeated at Ligny. In this engagement his horse was killed; and he was thrown under his body. In the battle of the 18th Blücher arrived at the most decisive moment upon the ground, and, taking Napoleon in the rear and flank, assisted materially in completing the great victory of Belle Alliance, or Waterloo. (q.v.). He refused the proffered armistice, and forced Paris to surrender; opposing with energy, on this second conquest of the capital, the system of forbearance practised on the former occasion. As he was already a knight of all the military orders of Europe, the king of Prussia, to reward his new services, created the new order of the Iron Cross expressly for him. After the Peace of Paris he retired to his estate, where he died. On the anniversary of the battle on the Katzbach, a monument commemorating his glory, executed by Schadow in Berlin, was erected at Rostock. On that of Waterloo (18 June 1826) a bronze statue 12 feet in height, modeled by Rauch, was erected to his memory in Berlin. Blücher was not so eminent for military science as for ability in action. His simplicity, good nature, and bravery endeared him to his sol-

BLUE—BLUE BOY

diers, who loved him as a father. His addresses and proclamations are distinguished for their brevity, precision, and simplicity. Consult 'Blücher's Life,' by Varnhagen von Ense (Berlin 1827); and Scherr's 'Blücher's Life and Times' (Leipsic 1862).

Blue, Victor, American naval officer: b. North Carolina, 6 Dec. 1865. He graduated at the naval academy June 1887, and serving through the grades of ensign and junior lieutenant, was promoted lieutenant 3 March 1899. At the outbreak of the war with Spain he was ordered to the gunboat Suwanee, and while on duty off the Cuban coast captured two Spanish patrol sloops having on board a heliographic signal outfit. On 11 June 1898 he landed at Aserraderos, passed through the Spanish lines, proceeded to the hills overlooking Santiago city and harbor, where he located the Spanish fleet commanded by Admiral Cervera. On 25 June he made a further reconnaissance and mapped the position of the Spanish ships. To accomplish these things he traveled a distance of nearly 140 miles, mostly through territory occupied by the intrenchments of the Spanish army. Admiral Sampson highly commended the manner in which these tasks had been performed and recommended that Lieut. Blue be advanced ten numbers as a promotion. He was placed in command of the captured gunboat Alvarado, and on 12 Aug. 1898 bombarded the fortifications of Manzanillo. Subsequently he served in China and the Philippines.

Blue, one of the seven primary colors. The blue pigments commonly employed by artists are few in number, including native and artificial ultramarine, cobalt, indigo, and Prussian blue. Genuine ultramarine, prepared from the mineral lapis lazuli, and ordinary cobalt blue, sold for artists' work, are permanent colors. They are used either alone, or mixed with other pigments, chiefly for skies and distances in landscape, and by themselves, or to make up grays and other mixed tints in figure painting. Owing to the exceptionally high price of real ultramarine, the artificial color, which is of doubtful permanency, is usually substituted for it. Prussian blue and indigo are highly useful colors, since it is only these that yield dark blues, and only from them, mixed with yellows or browns, that strong greens can be obtained. It is unfortunate accordingly that both are more or less fugitive. All the blues above named are used both in oil or water color painting, but indigo less than the others in oil, since it is most apt to fade in that medium.

A number of different names are used in commerce for what is essentially the same pigment, or for pigments closely resembling one another. The following statement gives some explanation of these: Cobalt blues are mixtures of cobalt with earthy or metallic bases, which have been subjected to the action of heat, and have received the following names: Cobalt blue, cerulean blue, royal blue, Dumont's blue, Saxon blue, Thénard's blue, Leithner's blue, Hungary blue, Zaffre or enamel blue, Vienna blue, azure blue, and Paris blue. The last name is also applied to a Prussian blue, and azure is also given to a variety of ultramarine blue. Smalt is a powdered cobalt glass used in illumination and flower painting. Artificial ultramarine is also called French ultramarine, French blue, new

blue, and permanent blue. Coarse qualities of this color are largely used by house painters. Intense blue is a refined indigo. Prussian blue (sesqui-ferrocyanide of iron) is otherwise named Berlin blue, Paris blue, and ferrocyanide of iron. The name Paris blue is also given to a cobalt color. Antwerp blue is a variety of Prussian blue made lighter by the addition of an aluminous base, and not so permanent. Blue ochre (hydrated phosphate of iron) is a subdued permanent blue, but not much employed. Blue verditer is a hydrated oxide of copper which changes and ultimately blackens by time. It is used in distemper work and paper staining. Blue was adopted as their distinctive color by the Scottish Covenanters in the 17th century and is the usual color of the uniforms of the soldiers of the United States army. A dark shade of this color is generally worn by the sailors of most countries, whence the term navy blue is derived.

Blue Beech. See HORNEBEAM.

Blue Bird, or the North American thrush, is widely distributed throughout the United States, where it holds a similar place, in the hearts of the people, as the redbreast in England. In fact, locally, it is sometimes termed "blue-robin." It is a smaller bird than the rest of the thrushes. Its whole upper parts are sky blue, shot with purple; with its throat, neck, breast, and sides reddish chestnut, and part of its wings and its tail feathers black. The "soft and agreeable warble" of the bluebird is one of the first and most welcome sounds of bird-music, that we hear in the early spring. The male is remarkably attentive to his more protectively colored mate, and takes exuberant pride in their five or six pale-blue eggs, laid in holes in the trees of gardens, and often also in bird-boxes, and in the crevices in the walls of outbuildings. There are often two broods in a season. The bluebird fights hard to protect his small, neatly constructed nest from the house-sparrow, swallows, wrens, and other birds, which make his life miserable by their intrusion on his domestic privacy. Several other sorts of birds, of other countries, prevaillingly blue in color, receive the name "bluebird," such as the "Oriental fairy-bluebirds" of the genus *Irena*, more particularly *Irena puella*, one of the East Indian bulbuls.

Blue Books, the official reports, papers, and documents printed for the British government to be laid before the Houses of Parliament. They are so called simply from being stitched up in blue paper wrappers, and include bills presented to, and acts passed by, the houses; reports and papers moved for by members or granted by government; reports of committees; statistics of trade, etc. The term is used also in a broad way as descriptive of special reports put forth by the government of any country or its various executive departments. In the United States the published lists of government employees and the navy regulation manual are known as Blue Books and the foreign diplomatic correspondence is commonly issued in Red Books. French official reports, etc., are called Yellow Books; those of Italy are styled Green Books, and those of Spain Red Books.

Blue Boy, The, a celebrated picture by Gainsborough, dated 1679; its subject, a boy dressed in a blue satin 16th century costume.

BLUE-COAT SCHOOL—BLUE LAWS

Blue-coat School. See **CHRIST'S HOSPITAL**.

Blue Flag. See **IRIS**.

Blue Grass, Kentucky Blue Grass, June Grass, Meadow Grass, Spear Grass, a species (*Poa pratensis*) of the natural order *Cramina*, native of the cooler parts of the northern hemisphere. The plant is a perennial with very numerous rootstocks and long, soft radical leaves. The more or less leafy stems which rise from one to two feet are terminated by a loose, pyramidal panicle three to four inches long, which readily distinguishes it from its somewhat larger close relative, Texas blue grass (*P. arachnifera*), in which the panicle is contracted and which is further distinguished by its woolly seeds. Blue grass forms a dense sod, which is very resistant to the trampling of stock, upon soils favorable to its growth, and is ranked as the best pasture and lawn grass throughout its range in districts and upon soils adapted to it. It attains its highest development upon limestone soils, and where found growing naturally, is considered to indicate a superior agricultural soil especially useful for stock raising. The Blue Grass region of Kentucky, which also extends into Tennessee, and from which the former State derives one of its popular names, is of limestone formation, and is noted for its superior, strong-boned, well-formed stock, especially horses. Upon soils other than limestone this grass does not produce so well and upon sandy soils it usually fails. Blue grass hay is of high quality, but is produced in too small amount to pay as well as other hay grasses. The hay cut when the seed is in the milky stage, has the following composition: Nitrogen-free extract, 34.3; crude fibre, 24.5; water, 24.3; ash, 7.0; proteid matter, 6.3; fat, 3.6. If the grass be allowed to mature its seed before being cut it is somewhat less nutritive because of the change in the relative proportion of nutrient material to non-digestible matter. The composition of the fresh grass is as follows: Water, 65.1; nitrogen-free extract, 17.6; crude fibre, 9.1; proteid matter, 4.1; ash, 2.8; fat, 1.3. Texas blue grass (*P. arachnifera*) is a valuable species for the Southern States, where Kentucky blue grass is less resistant to the effects of drouth. Both species may be propagated by sowing seed or by setting out pieces of sod, a method most commonly practised with the southern species, because of the difficulty of spreading its woolly seeds evenly. The method is very popular in lawn-making with the northern species. Since the seed of Kentucky blue grass is often of low vitality, and is frequently mixed with chaff, it should be sown rather thickly. A permanent blue grass pasture requires about three years to become established, after which, without much attention, beyond ordinary fertilizing, it may remain profitable for half a century or more. In long settled districts there are occasional pastures of more than 75 years standing.

Blue Grass State, a nickname for Kentucky.

Blue-green Algæ. See **CYANOPHYCÆ**.

Blue Hen State, a nickname for Delaware. During the War for Independence, a certain popular officer of Delaware, named Capt. Caldwell, asserted that a game cock to be unconquerable must be "a blue hen's chicken." This name

was at once applied to his regiment and later to the State and its people.

Blue Island, Ill., a city of Cook County situated on the Calumet River and on the Illinois C., the Chicago, R. I. & P., the Chicago & G. T., and the Chicago & C. T. R.R.'s. It forms a southern suburb of Chicago, about two miles south of the city limits, and is an important manufacturing, commercial, and railroad centre. Among its industries are brick-making, stone-quarrying, etc. There are also smelting-works, oil-works, and breweries. It was settled in 1833 and incorporated in 1872. The municipal organization provides for a mayor with a term of two years, and a city council. The city operates its own waterworks and electric light system. Pop. (1910) 8,043.

Blue Jay. See **JAY**.

Blue John, a name for fluorspar (q.v.).

Blue Laws, a term sometimes applied to the early enactments of several of the New England colonies, but more frequently limited to the laws of New Haven Colony. The origin of the term is not exactly known. Various conjectures have been made, but the most probable derivation is that given by Prof. Kingsley, who thinks the epithet "blue" was applied to any one who immediately after the Restoration of the Stuarts looked with disapprobation on the licentiousness of the times. Thus, in Hudibras,

For his religion, it was fit
To match his learning and his wit;
'Twas Presbyterian true blue.

That this epithet should find its way to the colonies was a matter of course. It was here applied not only to persons, but to the customs, institutions, and laws of the Puritans, by those who wished to render the prevailing system ridiculous. Hence, probably, a belief with some that a distinct system of laws, known as the blue laws, must somewhere have had a local habitation. The existence of such a code of blue laws is fully disproved. The only authority in its favor is Rev. Samuel Peters, whose 'General History of Connecticut' (1781) is a spiteful, satirical work, full of exaggerations. The traditions upon this subject, from which Peters framed his stories, undoubtedly arose from the fact that the early settlers of New Haven were uncommonly strict in their application of the "general rules of righteousness." Judge Smith, in his continuation of the history of New York, published in 'New York Historical Collections,' Vol. IV., gives evidence against the existence of the blue laws, which is particularly valuable, as it was put on record some 15 years before Peters' history was published. He writes: "Few there are who speak of the blue laws (a title of the origin of which the author is ignorant), who do not imagine they form a code of rules drawn up for future conduct, by an enthusiastic precise set of religionists; and if the inventions of wits, humorists, and buffoons were to be credited, they must consist of many large volumes. The author had the curiosity to resort to them when the commissioners met at New Haven for adjusting a partition line between New York and Massachusetts in 1767; and a parchment covered book of demi-royal paper was handed him for the laws asked for, as the only volume in the office passing under this odd title. It contains the

BLUE LIGHT—BLUE-STOCKING

memorials of the first establishment of the colony, which consisted of persons who had wandered beyond the limits of the old charter of Massachusetts Bay, and who, as yet unauthorized by the Crown to set up any civil government in due form of law, resolved to conduct themselves by the Bible. As a necessary consequence, the judges they chose took up an authority which every religious man exercises over his own children and domestics. Hence their attention to the morals of the people in instances with which the civil magistrate can never intermeddle in a regular well-policed constitution, because to preserve liberty they are recognizable only by parental authority." See Trumbull, 'True Blue Laws of Connecticut and New Haven, and the False Blue Laws Invented by Rev. Samuel Peters' (1876); Prince, 'An Examination of Peters' Blue Laws,' in Annual Report of the American Historical Association for 1898.

Blue Light. See BENGAL LIGHT.

Blue-light Federalists, a term applied to the party in American politics which opposed the War of 1812. In 1813 Decatur made several attempts on dark nights to escape from the blockaded port of New London, Conn. He declared that his failure was due to signals of blue lights flashed from the shore to warn the British. This led to the opponents of the war, who were accused of having shown the lights, being stigmatized as "Blue-light Federalists."

Blue Lodges, a secret association of advocates of slavery, organized about 1854, in Missouri, for the purpose of aiding the work of establishing slavery in Kansas. The members of the order, although citizens of Missouri, crossed into Kansas in 1855 and forcibly deposited their ballots for the pro-slavery candidates.

Blue-Mantle, one of the English pursuivants at arms, connected with the Herald's College, so styled from the color of his robe.

Blue-mann. See MERCURY.

Blue Monday, a name formerly given in Europe to the Monday before Lent, when the churches were decorated with blue. It was kept as a holiday by classes whose ordinary avocation required them to labor on Sundays. As this led to violent disturbances the custom was legally abolished. The term now signifies a Monday of depression, or blue spirits, particularly among clergymen, but is very loosely used, and by hard-working persons is applied to Monday in general.

Blue Mountains, (1) a beautiful wooded range of mountains in Oregon, from 8,000 to 9,000 feet high, which, with the Powder River Mountains, separate the Columbia River valley from the Great Basin; (2) a mountain chain of New South Wales, part of the great Dividing Range. The highest peak is Mount Beemarang, which attains an elevation of 4,100 feet above sea-level. The range is now traversed by a railway, which attains a maximum height of 3,494 feet; (3) the Central mountain range of Jamaica, the main ridges of which rise to 8,000 feet; (4) the second main ridge of the Appalachians, known also as the Kittatinny Mountains in Pennsylvania, as the Shawangunks in New York. This range should not be confounded with the Blue Ridge (q.v.).

Blue Nile. See NILE.

Blue Nose, a popular nickname for a native of Nova Scotia.

Blue Peter, a blue flag having a white square in the centre, used to signify that the ship on which it is hoisted is about to sail, and for recalling boats. The term is a corruption of Blue repeater, one of the signal flags in the British code. A flag known as the comet is used as a sailing signal in the United States instead of the blue peter.

Blue-pill. See MERCURY.

Blue Point, N. Y., the southern extremity of Patchogue Bay, Long Island, which lends its name to the well-known oysters, Blue Points.

Blue Print, a positive photographic print from a transparent negative on paper sensitized by potassium ferricyanide and citric acid, giving white lines on blue ground.

Blue, Prussian. See DYES.

Blue-ribbon Army, the name of an English total abstinence society, so called from the color of the membership badge. The organization grew out of the Murphy Movement in America and dates from 1878. About five years later the society became known as the Gospel Temperance Union. See TEMPERANCE SOCIETIES.

Blue Ridge, the most easterly ridge of the Alleghany or Appalachian Mountains, which extends from the Hudson River southwest to Georgia. It first receives the name of Blue Ridge when it enters Virginia, the western portion of which it traverses. In south Virginia, the range becomes a broad plateau, which is at its widest in North Carolina, and is here crossed by the Black, Cowee, Nantahala, and South mountains, extending transversely to the axis of the Blue Ridge. The highest peaks of the range occur in the Black Mountain group, where are found Mount Mitchell or Knob Dome, 6,710 feet; Guyot's Peak, Sandoz Knob, Gibbe's Peak, and a few others over 6,000 feet. In Virginia the Blue Ridge nowhere rises much above 4,000 feet, and in Pennsylvania and New Jersey its height is much less. Several large rivers pierce the ridge, such as the Hudson in the Highlands, the Delaware at the Water Gap, and the Potomac at Harper's Ferry. See also APPALACHIANS.

Blue-stone, or Blue-vitriol. See COPPER.

Blue-stocking, a pedantic woman; a lady regarded as too fond of learning. The origin of this name is thus given by Boswell in his 'Life of Johnson': "About this time (1780) it was much the fashion for several ladies to have evening assemblies, where the fair sex might participate in conversation with literary and ingenious men, animated with a desire to please. These societies were denominated blue-stocking clubs, the origin of which name was as follows: One of the most eminent members of these societies was Mr. Stillingfleet, who always wore blue stockings. Such was the excellence of his conversation, that his absence was felt as a great loss, and it used to be said, 'We can do nothing without the blue stockings'; and thus by degrees the title was established." One of the most famous of these clubs was that which met at Mrs. Montagu's. This was sometimes honored by the presence of Dr.

BLUE THISTLE—BLUEFIELDS.

Johnson, and its principal members have been sketched and eulogized by Hannah More, in her poem entitled the 'Bas Bleu.'

Blue Thistle. See BUGLOSS.

Blue-vitriol, called also **Blue-stone**, the salt, sulphate of copper, composed of sulphuric acid, oxide of copper, and water. It is a natural product of some mines of copper ores, and is also largely prepared for economical purposes. See COPPER.

Blueback, the salmon of the Fraser River, B. C., one of the most valuable of the Pacific salmon (q.v.). The name is given to various other fishes having bluish backs.

Bluebeard, a famous hero of legend and folklore, familiarized to English readers in the 18th century through a translation from the French of Charles Perrault, 1697. This tale of Bluebeard has been regarded by some as partly historic, of which the original was Gilles de Laval, Baron de Retz, who was burned at Nantes in 1440 for his cruelty to children, whom he is supposed to have enticed into his castle, where he sacrificed them to the devil. It is, however, really a *märchen*, and the leading idea of curiosity punished is world-wide. The forbidden chamber is a counterpart of the treasure-house of Ixion, on entering which the intruder was destroyed, or betrayed by the gold or blood that clung to him; also of Pandora's box, as well as of Proserpine's pyx that Psyche opened in spite of the prohibition. There are several parallels among the German fairy-tales collected by Grimm; and one feature at least is found in the Kaffir tale of the Ox (Callaway's 'Nursery Tales of the Zulus'). Variants are found in Russia, and among Gaelic popular tales; and in the Sanskrit collection 'Katha Sarit Sagara,' the hero Saktideva breaks the taboo, and like Bluebeard's wife, is confronted with the horrible sight of dead women. Possibly in the punishment following the breaking of the taboo may be a survival of some ancient religious prohibition; among the Australians, Greeks, and Labrador Indians, such an error was regarded as the means by which death came into the world. Frescoes of the 13th century have been found in Morbihan, Brittany, representing scenes from the similar legend of St. Trophime. Tales similar to that related by Perrault are found in Straparola's 'Piacevoli Notti' (1569), and in Abbatutis' 'Il Pentamerone,' while a not very dissimilar tale is that of the Third Calendar in the 'Arabian Nights Entertainment.' Operas founded upon it are Grétry's 'Raoul Barbe-Bleu' (1789); Offenbach's 'Barbe-Bleu' (1866).

Bluebell, **Bellflower**, **Hairbell**, or **Harebell**, *Campanula rotundifolia*, a plant of the natural order *Campanulaceae*, native of the colder parts of the northern hemisphere. Its common name is suggested by the shape and color of its flowers, and its specific name from the shape of its root-leaves. The stem leaves are lanceolate or otherwise than round. This is the bluebell of Scotland and of literature. It may be found peeping through the snow and ice which are supposed to be melted by the self-generated heat of these little plants. They have long been favorites in the hardy flower border and are of simplest culture. (See also CAMPANULA.) The name is also applied to a species of *Scilla* (q.v.).

Blueberry. See HUCKLEBERRY; VACCINIUM.

Bluebill, one of the most common of American fresh-water ducks, which breeds throughout Alaska and the northern part of Canada generally, spending the cold months in the United States, but going only as far south as is necessary to avoid the freezing of the lakes and ponds. The head, neck, and fore part of the body of the drake are black, the head with a green gloss. The back and sides are whitish with finely waved blackish markings. The abdomen and speculum of the wing are white. In the female the head and anterior parts are brown, and the face pure white. The most distinguishing part of the bird is the very broad, spatulate bill, which is light blue, with a black nail. Hence the other names "broadbill," and "scaup duck." There are two species, the larger (*Aythya marila nearctica*) the one just described, which is regarded as a variety of the European scaup duck; and the lesser (*A. affinis*), which is very similar to the preceding, but smaller, and rather more southerly in its distribution. These ducks are close relatives of the canvasback and redhead (qq.v.), and resemble them in habits. Other local names for them are "blackhead" and "shuffler."

Bluebottle, or **Corn-flower** See CENTAUREA.

Bluebottle Fly, a greenish-blue fly, sometimes called by English authors "green-bottle" fly (*Lucilia caesar*). It closely resembles the blow-fly (q.v.), but is smaller and entirely blue or green. These flies hibernate through the winter, appearing early in spring. Its eggs are deposited upon meat and decaying animal matter. The larvæ are said to be indistinguishable from those of the blow-fly. They are white, footless maggots, of an elongated conical shape, which transform in the ground. It is said that bluebottle flies do not commonly enter houses.

Bluebreast. See BLUETHROAT.

Bluebuck, the name given by English workmen in South Africa to one of the duikers, the pigmy antelope (*Cephalophus monticola*) of Natal. These tiny creatures, which stand only 13 inches high, are the smallest of the antelopes, and grayish-blue in color, with short, spike-like horns, which hardly show above the tuft of stiff hairs on the top of their heads. They swarm in the thickets of southeast Africa, feeding on herbage berries and buds, scrambling about the rocks, and climbing leaning tree trunks, with amazing agility.

Blue-eye, a small and favorite species of honey-eater (*Entomysa cyanotis*) with a conspicuous patch of blue about the eyes. It frequents the eucalyptus trees, and has the curious habit of depositing its eggs in a neat depression on the top of the big, oven-shaped nest of a certain starling, whenever it can find a deserted one. Otherwise it constructs a nest for itself. See HONEY-EATER.

Bluefields (formerly written BLEWFIELDS), a town on Nicaragua, on the Caribbean coast and at the mouth of the Escondido or Bluefields River. Lat. 12° N., lon. 83° 44' W. It was the capital of Mosquitia (see CENTRAL AMERICA). In the latter part of 1847 the population was about 600, one sixth white, five sixths black. Slavery was abolished in 1841. The king of Mosquitia, who resided here in one of the few

BLUEFIN—BLUING

houses built of boards, claimed sovereignty over a territory 235 miles wide and 340 miles long; also the districts of Talamanca and Chiriqui in Costa Rica. A British agent and consul-general also was stationed at Bluefields, the English government maintaining a protectorate over the Mosquito Indians until 1860. A German colony at Carlsruhe, adjoining Bluefields, was founded in 1844, but abandoned in 1849. The climate is moist and hotter than in the interior. In 1901 the company to which the Nicaraguan government granted a concession and monthly subvention for the establishment of a line of steamers agreed to make six trips a month between Bluefields and New Orleans, and to carry the mails between those points eight times monthly.

Bluefin, or **Blackfin**, a large cisco-like whitefish (*Argyrosomus nigripinnis*) of the deep waters of Lake Michigan and some other of the lakes of Wisconsin and Minnesota, readily known from other species by its black fins.

Bluefish The bluefish or "skipjack" (*Pomatomus saltatrix*) is one of the most widely distributed and abundant of sea-fishes, being found in the Atlantic from the Mediterranean and Nova Scotia to Brazil, and in the Pacific and Indian oceans. It is taken casually at all seasons on the eastern coast of the United States, but becomes numerous irregularly in summer, when its presence or absence seems to be governed largely by the movements of its principal food, the menhaden (q.v.), when seeking their inshore spawning-grounds. The only wonder is that both have not been exterminated many centuries ago, for of all the butchers of the sea the bluefish is the most wolfish and diabolical, snapping its prey in half for a mouthful and passing on in ruthless industry. It is beautifully shaped for swimming, built with the fine lines of the mackerel and the strength of the salmon. It is a near relative of the pompanos and horse-mackerels (family *Carangidae*), but is set apart in a family (*Pomatidae*) by itself, which Jordan considers an offshoot toward the percoids. In color it is steel-blue, and its flesh is very sweet and savory. The weight varies, five pounds being the common run, although 20 pounds are recorded.

The favorite method of fishing for it is "squidding," or casting from a platform built out into the surf, with a rod and line armed with a spoon, or a bone-baited hook. Its voracity makes it a free biter, and its temperament makes it a fierce one, so that the angler may expect a fight from the strike to the death, and only by sheer strength can the prey be landed. The bluefish is also trolled for from boats, especially in Florida, and off the south coast of New England.

On our Pacific coast the "California bluefish" (*Cynoscion parvipinnis*) is found from Santa Barbara to Guaymas and Mazatlan, and is a near relative of the eastern weakfish (q.v.), locally called "totuava" (*Cynoscion macdonaldi*). In the Gulf of California it congregates at the mouth of the Colorado River and attains enormous size, having been taken in hand-lines as high as 170 pounds. Like other species of this genus, it is erroneously yet frequently called "sea-bass." The bluefish thrives on sardines and other small fish. Assuming that one bluefish eats 10 small fish a day, it has been figured that it requires ten thousand million sardines to feed

the one thousand billion bluefish on our coasts every summer.

Consult Jordan and Evermann, 'Food and Game Fishes of America' (1902); Goode, 'Fishery Industries, Section 1' (10th census, Washington, 1884); Mayer (editor), 'Sport with Rod and Gun' (1892).

Bluegowns, an order of paupers in Scotland, called also the "King's Bedesmen," to whom the kings annually distributed certain alms on condition of their praying for the royal welfare. Their number was equal to the number of years the king had lived. The alms consisted of a blue gown or cloak, a purse containing as many shillings Scots (pennies sterling) as the years of the king's age, and a badge bearing the words "Pass and repass," which protected them from all laws against mendicity. Edie Ochiltree, who figures prominently in Scott's novel 'The Antiquary,' is a type of the class, but probably a favorable specimen as compared to those who were to be met with in real life. The practice of appointing bedesmen was discontinued in 1833, and the last of them drew his last allowance from the exchequer in Edinburgh in 1863.

Bluethroat, an Old World bird (*Cyanecula suecica*) related to the European robin, and deriving its name from its bright blue throat, which is separated from the white below it by crescent-shaped bands of rust-red and white. It is one of the most highly migratory birds known, spending its winters in tropical Africa and India, and during the summer breeding in Scandinavia, northern Russia, Siberia, and western Alaska. It makes its nest in bushes and weeds along streams, as far north as 71 degrees. It is extraordinary in never being seen in the intermediate countries, between its summer and winter homes, so that it stands to reason that the journey is made at a single flight, either at night, or at an invisible altitude. The bluethroat is celebrated for its fine singing, and powers of mimicry when in its summer home, on account of which the Laplanders call it "the bird of the hundred voices." Consult Gätke, 'Birds of Heligoland' (English translation 1895); and works on European, Siberian, and Alaskan ornithology.

Bluwing, a duck. See **TEAL**.

Bluffs, a term of American origin, synonymous with cliffs. It has long been used to designate the high cliffs met with along the Mississippi River; particularly those abrupt banks of loam on its eastern side below the mouth of the Ohio. These are continually washed and undermined by the action of the river, while the opposite side, rising more gently back from the river, is but slightly washed by its waters. On the south shore of Lake Superior, near the Pictured Rocks, is a most remarkable bluff of loose, blowing sand, which rises so steeply from the edge of the water to the height of 200 feet, that one would in vain endeavor to ascend it. The waves and the winds beat against it from the north, and keep its materials continually in motion; but more sand appears to be always supplied to replace that which is borne away.

Bluing, a compound dissolved in water to whiten clothes after washing. The indigo preparation once largely used has been extensively superseded by Prussian blue.

BLUING OF METALS—BLUMENTHAL

Bluing of Metals, the process of giving a blue color to metallic substances by heat. Iron, when heated, becomes first of a light, then of a darker gold color, and finally blue. Steel heated to redness and suddenly cooled, is rendered hard and brittle. It is restored to any degree of softness, by heating it up to certain temperatures and allowing it to cool slowly. These temperatures are precisely indicated by the color of the film of oxide which forms upon its surface. At 430° F. it is straw yellow of the very hard temper suitable for lancets. At higher temperatures it appears successively a golden yellow, then brown, purple, blue, and finally green. Pale blue at 550° is the temper for swords and watch springs. The common shade of blue, at 560°, is the temper for fine saws and dirks. Deep blue, at 600°, is the soft quality of steel for large saws.

Blum, blün, Ernest, French dramatist: b. Paris, 15 Aug. 1836. Either alone or in collaboration with other dramatists he is the author of many highly successful plays. The drama of 'Rose Michel' (1877), of his own composition, insured his place among the most successful French dramatists of the time. Among his later compositions are 'Adam and Eve' (1886); 'The Nervous Woman' (1888); 'End of the Century' (1890); 'La reïeuse' (1894); 'Le Carillon' (1897).

Blum, Hans, hänts bloom, German publicist: b. Leipsic, 1841. He is a son of Robert Blum (q.v.), was educated in the universities of Leipsic and Bern, sat in the North German Reichstag 1867-70, and was a barrister in Leipsic 1869-97. He has written extensively on contemporary politics and among his works are 'Die Lügen unserer Sozialdemokratie' (1891); 'Fürst Bismarck und seine Zeit' (1894-5); 'Das erste Vierteljahrhundert des deutschen Reichs' (1896); 'Persönliche Erinnerungen an den Fürsten Bismarck' (1900). He has also written two dramas and several novels.

Blum, bloom, Robert, German patriot: b. Cologne, 10 Nov. 1807; d. Vienna, 9 Nov. 1848. He served for a short time in the army, and became subsequently connected with the Leipsic Theatre, of which he acted for some time as secretary and treasurer. About the year 1840 he began to come prominently forward as the champion of the Liberal cause, and acquired much renown as a popular orator. On the outbreak of the commotions of 1848 he manifested great enthusiasm, and became soon the rallying-point of democracy in Saxony, and the leading member of opposition in the National Assembly at Frankfort, to which he was sent that year as member for Leipsic. The events of October at Vienna inspired him with fresh energy, and he proceeded thither at the head of a deputation to express the sympathy of the German democrats in the Frankfort Assembly with the Viennese. He took an active part in the conflict of the citizens with the imperialists; but on the surrender of the capital to Windischgrätz, was arrested with several of his companions on 4 November. Brought before a military tribunal, he pleaded in vain his privileges as a deputy from the German diet, and was condemned to be hanged, a sentence which was changed to death by the bullet.

Blum, blüm, Robert Frederick, American artist: b. Cincinnati, O., July 1857; d. 1903.

He studied at the Philadelphia Academy of Fine Arts, and among his works are 'Venetian Bead Stringers,' which received a prize of \$2,500 at the American Art Association exhibition in New York in 1889. Although he worked in oils he was best known as a water-colorist and painter in pastels. He ranked among the most brilliant of American water-color artists.

Blumenbach, Johann Friedrich, yō'hān frēd'rīh bloo'mēn-bāh, German naturalist of distinction: b. Gotha, 11 May 1752; d. Göttingen, 22 Jan. 1840. He studied at Jena and Göttingen, and was appointed in the latter, in 1776, extraordinary professor of medicine and inspector of the museum of natural history, and in 1778 ordinary professor. In 1812 he was appointed secretary to the Royal Society of Sciences at Göttingen, in 1816 became physician to the king of Great Britain and Hanover, in 1821 was made a knight-commander of the Guelphic Order, and in 1831 was elected a member of the Academy of Sciences at Paris. In 1825 the jubilee of his graduation as doctor was celebrated. On this occasion a medal was struck, and an endowment founded under the name of the Blumenbach Stipendium or Bursary, to assist talented young physicians and naturalists, and enable them to make scientific travels. In 1835 he retired from public life. The first work which brought him into notice was the 'De Generis Humani Varietate Nativa,' and from its publication in 1775 he continued almost for 60 years to exert a powerful influence on the progress of science, both by the number of distinguished pupils who were indebted for their first training to his admirable lectures, and by his valuable writings, partly inserted in the 'Transactions' of scientific societies, and partly published as separate works. Among the latter, in addition to the thesis, which received important additions in subsequent editions, and may be said to have given a direction to the most important studies of his after life, are the 'Institutiones Physiologicae' (1787), long a textbook in many of the most celebrated schools of Europe; the 'Handbuch der vergleichenden Anatomie' (Handbook of Comparative Anatomy), and 'Collectio Craniorum Diversarum Gentium.' The last work gives descriptions and figures of his collection of skulls, one of the most extensive in existence, and still preserved at Göttingen. In regard to the important subject of which it treats, Blumenbach held decidedly that the human race formed only one species, and had originally descended from a single pair; but he divided it into the five varieties of Caucasian, Mongolian, Negro, American, and Malay.

Blumenreich, Franziska, frānts'is-ka bloo'mēn-rīh, German novelist: b. Bohemia, 2 April 1849. Among her very numerous novels the more notable are 'At the Abyss of Marriage' (1888); 'Freighted with Bliss' (1890); 'Storms in Port' (1892). She is a zealous advocate of woman's rights.

Blumenthal, Jacob von, yā'kōb fōn bloo'mēn-tāl, German pianist and composer: b. Hamburg, 4 Oct. 1820. Going to London in 1840, he became pianist to Queen Victoria, taught music, and was soon well known as a composer of popular pianoforte numbers and equally popular songs such as 'My Queen'; 'The Venetian Boat Song'; 'The Broken

BLUMENTHAL — BLUNT

Flower'; 'The Bend in the River.' The familiar hymn tune, 'Blumenthal,' is an adaptation of his composition, 'The Two Angels.'

Blumenthal, Oskar, ös'kär bloo'män-täl, German dramatist and critic: b. Berlin, 13 March 1852. Sprightliness of dialogue is the most distinguishing character of his plays; the most successful of them are 'The Big Bell'; 'A Drop of Poison'; 'The Black Veil.' He has published several volumes of critical and miscellaneous essays.

Blundell, (Mrs.) Francis (M. E. FRANCIS), English novelist: b. Dublin. She is the widow of Francis N. Blundell and has lived for many years in Lancashire, but more recently in Dorsetshire. Her writings, which have steadily increased in popularity, both in England and the United States, are: 'Whither?' (1892); 'In a North Country Village' (1893); 'The Song of Dan' (1894); 'Town Mice in the Country, a Story for Children' (1894); 'A Daughter of the Soil' (1895); 'Frieze and Fustian' (1896); 'Among the Untrodden Ways' (1896); 'Maime o' the Corner' (1897); 'Miss Erin' (1898); 'The Duenna of a Genius' (1898); 'Yeoman Fleetwood' (1899); 'Pastorals of Dorset'; 'Fiander's Widow' (1901); 'North, South, and Over the Sea'; 'The Manor Farm' (1902).

Blundell's School, a famous English free grammar school in Tiverton, Devonshire, founded in 1604 by Peter Blundell, who left his fortune to charities, the school being the most important of his benevolences. In connection with it five Balliol College scholarships were founded and many persons who afterward became eminent went to Balliol College, Oxford, from Tiverton School. The school is mentioned in the novel 'Lorna Doone' as the scene of John Ridd's early education. In 1880 new buildings in the Tudor style were built for the school in the outskirts of the town. The late archbishop of Canterbury, Frederick Temple, was a student at Blundell's School.

Blunderbuss, a short, heavy, large-bored firearm, often brass-barrelled, and bell- or trumpet-mouthed. It was used to discharge a heavy load of slugs or small bullets at a short range, and was once generally employed as a weapon for the defense of houses against burglars. As a military weapon, it was used occasionally on shipboard for repelling boarders, or pouring heavy volleys into boats, when attempting to cut vessels out from anchorage. It is now wholly disused. See SMALL ARMS.

Blunt, Edmund March, American author: b. Portsmouth, N. H., 20 June 1770; d. Sing Sing, N. Y., 2 Jan. 1862. He is remembered for his publication of the 'American Coast Pilot' (1796), describing all the coasts of the United States, and containing a vast amount of invaluable information for seamen. More than 30 editions of this work have been published, and it is still in use in the United States and the principal European countries, having been translated into nearly every foreign language. He also compiled a number of nautical books and charts.

Blunt, George William, American hydrographer: b. Newburyport, Mass., 11 March 1802; d. New York, 19 April 1878; a son of Edmund March Blunt (q.v.). He went to sea when 14 years old and served as a sailor till

nearly 21; and in 1822-66 was a publisher of charts and nautical books in New York. He made original surveys of many American harbors; was one of the committee that organized the present system of pilotage for New York; made several revisions of the 'American Coast Pilot'; and was influential in causing the Federal government to adopt the French system of lighthouses and to organize the Lighthouse Board.

Blunt, James G., American soldier: b. Trenton, Maine, 1826; d. Washington, D. C., 1881. He settled as a physician in Anderson County, Kansas, in 1856; became prominent in the contest over the introduction of slavery into that State, and was a member of the convention that framed its constitution. Entering the army as lieutenant-colonel of the 3d Kansas Volunteers, he became brigadier-general, 8 April 1862, and was assigned to the command of the military department of Kansas. As such he was engaged in the battle of old Fort Wayne, defeated Marmaduke at Cane Hill, Ark., and, with the aid of Gen. Herron, defeated Hindman at Prairie Grove, and thus checked the Confederate advance into Missouri. He was promoted major-general, 29 Nov. 1862, and in October 1864 gave the final blow to Price's invasion of Missouri.

Blunt, John Elijah, English consular agent: b. 14 Oct. 1832. He entered the English consular service in 1850, and held various consular posts in Turkey, receiving in 1862 and again in 1868 the thanks of the President of the United States for his services to American citizens in the province of Adrianople. Since 1899 he has been consul at Boston, Mass., with the rank of consul-general.

Blunt, John Henry, English High Church theologian: b. London, 25 Aug. 1823; d. there, 11 April 1884. He held various curacies, and in 1873 was appointed to the living of Beverston, Gloucestershire. He wrote much, among his chief works being: 'Dictionary of Doctrinal and Historical Theology' (1870); 'Dictionary of Sects, Heresies, etc.' (1874); 'History of the English Reformation' (1868-82); 'Household Theology' (1865); 'Annotated Book of Common Prayer' (1866; revised and enlarged, 1884).

Blunt, John James, English divine: b. Newcastle-under-Lyme, 1794; d. Cambridge, 18 June 1855. From 1839 he was Lady Margaret professor of divinity at Cambridge. His works include: 'Sketch of the Reformation in England' (1832); 'Undesigned Coincidences in the Old and New Testament, an Argument for their Veracity' (1847); 'On the Right Use of the Early Fathers' (1857); 'History of the Church During the First Three Centuries' (1856); several volumes of sermons; etc.

Blunt, Stanhope English, American military officer: b. Boston, Mass., 29 Sept. 1850. He was graduated at the United States Military Academy and commissioned 2d lieutenant in 1872; rose through the ranks to major in the ordnance department; served at various posts and arsenals in the West; was a member of several boards, including that which selected the Krag-Jorgensen rifle for use in the army; and had command of the Rock Island Arsenal,

III. He has written 'Firing Regulations for Small Arms,' and numerous papers on the use of small arms.

Blunt, Wilfrid Scawen, English poet and traveler: b. Crabbet Park, Sussex, 17 Aug. 1840. He was attaché of legation at The Hague, Athens, Madrid, Buenos Ayres, and elsewhere; supported Arabi Pasha in the revolt in Egypt in 1881; and was imprisoned in 1888 for his insurrectionary actions in Ireland. He is author of: 'Sonnets and Songs by Proteus' (London 1875); 'The Love Sonnets of Proteus' (1881); 'The Future of Islam' (1882); 'The Wind and the Whirlwind,' political poems (1884); 'Ideas About India' (1885); 'In Vinculis' (1889); 'A New Pilgrimage' (1889); 'Esther: a Young Man's Tragedy' (1892); 'Stealing of the Marc' (1892); 'Griselda' (1893); 'Satan Absolved' (1899).

Blunthead, a columbrine snake of Java and the East Indies (*Amblycephalus monticola*). It is about three feet in length, and purple in ground color, but this is almost entirely concealed by the brown markings and mottlings, and the cheeks and lip-plates are carnation-red. It is perfectly harmless, and is welcomed by the natives to their houses as a vermin-destroyer. It owes its name to the squarish form of the head, which, as in many other species of the family, looks so much like that of a poisonous snake as to deceive most observers.

Bluntschli, Johann Kasper, yô'hân kâs'pâr blünt'shle, Swiss jurist and statesman: b. Zurich, 7 March 1808; d. Carlsruhe, 21 Oct. 1881. He became professor in the newly founded university in that city in 1833; took an active part in the political struggles that divided his country, and at first inclined to the party of reform, until the events of 1839 induced him to join the Conservatives, of whom he was, for a time, a leader. He was a councilor of state, and became a member of the government and of the Federal Directory, and afterward worked for the formation of a moderate Liberal Conservative Party in Switzerland. In 1848 he went to Munich as professor of civil and international law. There he published his 'Allgemeines Staatsrecht' (5th ed. 1876), on which his reputation as a juriscult chiefly rests; 'Deutsches Privat-recht' (3d ed. 1864); and, in conjunction with Arndts and Pözl, 'Kritische Ueberschau der Deutschen Gesetzgebung und Rechtswissenschaft' (6 vols. 1853-8). In 1861 he removed to Heidelberg University, and became a privy councilor of Baden, actively forwarding all Liberal measures in the state. Liberty in ecclesiastical matters he had equally at heart; he acted several times as president of the Protestantenverein, and it was after delivering a closing speech at the general synod of Baden that he died suddenly at Carlsruhe. He was the author of valuable histories of Zurich and of the Swiss Confederation, and of a number of works on law, being especially an authority in international law. His library is now possessed by the Johns Hopkins University at Baltimore.

Blushing, a sudden reddening of the face, caused by a rush of blood into the capillary vessels of the skin. A blush is excited by confusion of mind, arising from surprise or diffidence, modesty or shame, or conscious guilt and apprehension, showing the influence of the

passions and emotions on the nervous system and the circulation of the blood. Sudden fear and apprehension cause the blood to rush from the external surface to the internal organs, leaving the bloodless lips quite pale, and the whole face suffused with deathly pallor. It is a kind of inverse blushing; the one being a sudden flash of color in the face, the other a sudden flash of paleness.

Blüthgen, August Eduard Viktor, ow'-goost éd'oo-ärd vik'tör blüt'-gên, German novelist: b. Zörbig, near Halle, 4 Jan. 1844. He has won high distinction as a writer for the young. Among his stories for boys and girls are: 'The Rogues' Looking Glass' (1876); 'The Battle of Frogs and Mice' (1878); and with these is to be classed the letter-press (verses) of O. Pletsch's 'Picture Books.' Of novels and romances he is author of a great many; for example, 'The Peace Breaker' (1883); 'The Step-Sister' (1887); 'Madame the Countess' (1892); etc.

Blyden, Edward Wilmot, a negro author: b. St. Thomas, W. I., 3 Aug. 1832. After vainly seeking, in 1845, admission to some college in the United States, he went to Liberia, and graduated at the Alexander High School, of which he afterward was principal. In 1880 he became president of Liberia College, has held important government positions, and was commissioner to the Presbyterian General Assembly of the United States in 1861 and 1880. He is proficient in many languages, including Latin, Greek, Spanish, Hebrew, and Arabic. He has published: 'Liberia's Offering' (1873); 'From West Africa to Palestine' (1873); 'The Negro in Ancient History'; etc.

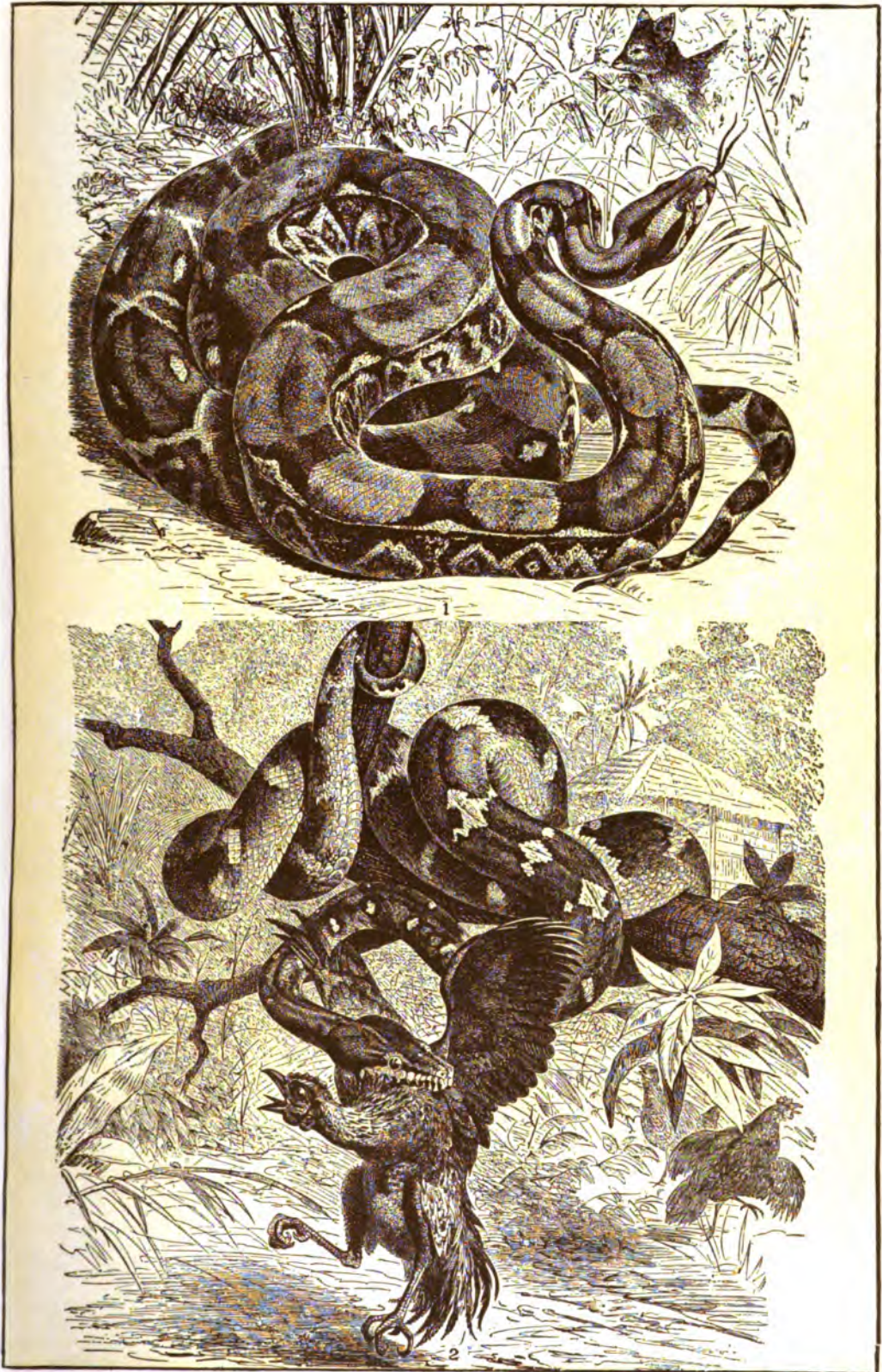
Blythe, Herbert. See BARRYMORE, MAURICE.

B'nai B'rith, b'nî b'rêth, **Independent Order of the**, an association of German Jews formed in the United States in 1843. Its purpose is the moral improvement of the members. Its organization resembles that of the Free Masons, but it is not a secret society, and has no elaborate ceremonial. The organization has since been established in Germany, and in the East. In 1901 it had over 340 lodges and 35,000 members.

Bo-tree, the sacred fig of India. See PEEPUL.

Boa, a serpent of that section of the family *Boiæ* called *Boineæ*. The boas are mostly of great size, and inhabitants of the forests of tropical America; and, with the pythons, constitute a family of the largest of modern snakes, which are noted for their power to enfold and fatally crush their prey in muscular coils. These serpents are notable not only for great size, but for certain structural peculiarities, of which the most noteworthy and characteristic is the fact that vestiges remain of the pelvis and hinder limbs, which appear externally as claw-like spurs on each side of the vent, which are of service in hanging from trees. The muscular power is very great, the tail is partly prehensile; and the bones of the head, and especially of the jaws, are more than ordinarily loosely joined together (see SNAKE), so that bodies surprisingly large may be swallowed. This family is distributed throughout all tropical regions, and is divided into two sub-families, by diversities of structure. One (*Pythoninæ*) con-

BOAS.



1. Boa Constrictor.

2. Dog-Headed Boa (*Xiphosoma Caninum*.)

BOABDIL—BOADICEA

tains the Old World pythons (q.v.), which have a pair of supraorbital bones, some teeth on the premaxilla, and the sub-caudal scales in two rows; while the boas lack supraorbital bones, never have premaxillary teeth and but a single row of scales on the under side of the tail. Most of the 40 or 50 species of *Boia* are American, but several small species inhabit the warmer parts of the Old World. Several of the American boas are very large snakes, perhaps occasionally reaching 30 feet in length, though few carefully measured have exceeded 20 feet; but such a one would weigh several hundred pounds, and be a very formidable foe to the largest animals exposed to their attacks. They inhabit the forests, and climb to the lower branches of the trees, where they seek or await their prey, usually above a path. There the serpent swings about in the air till some luckless animal approaches; then, suddenly relinquishing its position, he seizes the victim, and coils his body spirally round its throat and chest, till, after a few ineffectual cries and struggles, the animal is suffocated, and expires. In producing this effect, the serpent does not merely wind itself around its prey, but places fold over fold, as if desirous of adding as much weight as possible to the muscular effort; these folds are then gradually tightened with enormous force, and speedily induce death. The animals thus destroyed by the larger boas are sometimes as large as tapirs, deer, and even bullocks, but ordinarily the much smaller mammals and birds of the forest, while one species feeds mainly upon aquatic prey. Having crushed and rolled its prey until its bones are broken into pieces, and it is compacted into the form of a sausage, it takes it into its mouth, and at first by the help of the strong recurved teeth on its jaw bones, and later by reflex movements of its throat and ribs slowly engulfs it, the action being facilitated by a copious flow of saliva; but there is no truth in the reputed preparation of the prey by a covering of slime, etc., related in so many books. The process of digestion is slow, and while it is proceeding, the snake is inert, and easily caught and killed.

Several of the larger species are well known and often seen in menageries, where they are easily distinguished by the shape of the head and by the well-defined pattern of the markings. These are exceedingly handsome in most cases, the colors being yellow, buff, chestnut, and varying browns, set off by black and white; and the skins, which may be tanned into good leather with the scales on, are of high commercial value for making purses, belts, and other ornamental articles. Among the best known species are the common boa—the *Boa constrictor* proper (for that term is ignorantly given to all), which is one of the lesser forms, rarely exceeding 10 feet in length. Its home is the region of the Amazon and Orinoco rivers, and it is pale brown, with a chain-like series of dark-brown markings on each side of the spine, enclosing large oblong-oval spots, and a series of large dark spots along the sides, each with a light centre; on the tail the markings become brick-red. Several other species of this genus, some much larger, inhabit South and Central America. One, the imperial boa, has a Mexican variety, often called the *abonia*, which is believed to be the serpent venerated by the ancient Mexicans, and worshipped with bloody sacrifices. Two species of

true boas also inhabit Madagascar. Of a closely related genus is the great water-boa, or anaconda (*Eunectes nuernus*), which adds to the arboreal habits of the others the custom of crawling into the rivers and swamps of the half-flooded forests, where it lives, and there lying in wait for animals that come down to drink, or seizing those of semi-aquatic life. This is the largest, most formidable, and one of the handsomest of the tribe. Many species are of smaller size, down to only three feet in length, but all have similar habits. One genus (*Lichanura*) has a few species that dwell in the West Indies and Mexico, and are occasionally taken in Arizona and southern California; and small boas of this or an allied sort are frequently brought into the United States from Cuba, tightly coiled about bunches of bananas. They are harmless, of course, unless of a great size, having no poison sacs or fangs, and all the larger ones are susceptible of taming, and seem to acquire a positive regard for their human friends.

Boabdil, bō-ab-dēl', or **Abu-Abdullah**, ā'boo-ābd-ool'ah, last Moorish king of Granada. He gained the throne in 1481 by expelling his father, Mulei Hassan; but being attacked by Ferdinand of Aragon, was defeated and taken prisoner. His father having resumed his crown, Ferdinand set Boabdil at liberty, and promised to assist him against his father, on condition of his agreement to become the vassal of Spain. He accepted the ignominious condition, and his father died of a broken heart. Boabdil was not permitted to reign in peace. By his tyranny he provoked the hostility of his own subjects, and Ferdinand, taking advantage of the dissensions which prevailed, laid siege to Granada. The Moors made a valiant defense, and were prepared to bury themselves under the ruins of the city, but Boabdil capitulated, and retired to a domain of the Alpujarras assigned him by the victor. (1491). When on his way he turned round to take a last look of the city, and burst into tears. "Right, my son," exclaimed his mother, Aixa, who was standing by him, "weep like a woman for the throne which you had not the spirit to defend as a man and a king." The spot is still called "El Ultimo Sospiro del Moro" (the last sigh of the Moor). (See GRANADA.) Boabdil soon afterward passed into Africa, and fell in battle while assisting the king of Fez in an attempt to dethrone the king of Morocco.

Boadice'a, queen of the Iceni, a British tribe, inhabiting what are now the counties of Cambridgeshire, Suffolk, Norfolk, and Hertfordshire. She died about 62 A.D. The celebrated earthworks still extant, known as the Devil's ditch, at Newmarket heath, and at Six-Mile bottom, are supposed to be the fortifications of this tribe, and perhaps of this queen, against the Romans. She was a contemporary of Nero, and was a woman of remarkable character, both for firmness and ability. Her husband, the king of the Iceni, Prasutagus, dying, left Nero and his own two daughters joint heirs to his great wealth, hoping thereby to preserve his family and kingdom from the rapacity of the conquerors. But immediately on his death his kingdom was taken possession of by the Roman centurions. For some real or imaginary offense, the British queen was pub-

BOANERGES—BOAS

lily scourged by the executioner, and her daughters were abandoned to the lust of the slaves. Stung to frenzy by this outrage, taking advantage of the absence of Suetonius Paulinus, the Roman governor, from that part of England, Boadicea raised the whole military force of her barbarians, and bursting upon the Roman colony of London, reduced the city to ashes, and put to the sword in that and neighboring places,—of Roman citizens, traders, Italians, and other subjects of the empire,—at least 70,000 individuals. Suetonius lost not a moment in hurrying to the scene of action, although it was well known that the queen of the Iceni was in command of 120,000 men, which gradually increased to 230,000, according to Dion Cassius, while he could bring into the field in all less than 10,000 soldiers. It is true that absolute credit cannot be given to statements of prodigious numbers, such as the above, but at all events the disparity of force was extraordinary. The legion, posted on heights, where its flanks and rear were covered by woods, seems to have received the attack passively, sheltered from the missiles of the Britons by their large, oblong bucklers, until, when the darts and arrows of the barbarians began to fail, by one compact charge they carried all before them. They spared nothing; women, children, the beasts of burden, the dogs, were all cut to pieces. It is said that 80,000 Britons were butchered that day, while of the legionaries only 400 fell, and about as many more were wounded. It is believed that the action took place not far from St. Albans, Verulamium, a Roman colony, which at the first irruption had shared the fate of London. The queen, seeing that her cause was lost, committed suicide, rather than submit to the conqueror. Beaumont and Fletcher's play, 'Boadicea,' is founded upon the resistance made by Boadicea against Suetonius.

Boanerges, bō-ā-nér'jēz, an appellation given by Christ to two of his disciples, the brothers James and John, apparently, on account of their fiery zeal. See Mark iii. 17.

Boar, **Wild**, a ferocious, swift-footed species (*Sus scrofa*) of wild swine, made dangerous by its extreme courage and superior strength. It is found in marshy forest-grounds of Europe, Asia Minor, and North Africa. The boar is much larger than the domesticated swine; and covered with short, grayish-black, woolly hair, thickly interspersed with stiff bristles, assuming the form of a crest along the spine. The great tusks of the lower jaw are formidable weapons in youth, but later becoming useless by curving over the snout, when the teeth of the upper jaw which protrude and curve out take their place as weapons. The boar seeks its food at night and feeds on roots, grain, and small animals, birds' eggs, etc. Besides this species, several others exist, notable among which are *Sus vittatus* of Asia and Africa, *Sus verrucosus* of Java, and the Celebes and *Sus barbatus* of Borneo. Boars were common in England until the time of Henry II., when they seemed to disappear for the time being, reappearing again in the reign of Charles I. Formerly the sport of hunting this animal with the aid of great dogs (boarhounds), was the favorite amusement of the nobles of France and Germany, but is now rarely followed except

in a few estates in eastern Europe, where the animal is preserved for the purpose. In India, however, the chase of the wild boars of that country, usually called "pig-sticking," is still foremost among the field-sports of the Anglo-Indians.

Board, the collective name applied to a number of persons having the management, direction, or superintendence of some public or private office or trust; often an office under the control of an executive government, the business of which is conducted by officers specially appointed, as board of admiralty, board of trade, etc.

Boardman, George Dana, American missionary; b. Livermore, Me., 8 Feb. 1801; d. 11 Feb. 1831. He studied at Andover and was ordained in the Baptist Church. In 1825 he went to India, and in 1827 to Burma, where he labored assiduously in spreading Christianity. The mission planted by him became the central point of all Baptist missions in Burma.

Boardman, George Dana, American clergyman and author; b. Tavoy, British Burma, 18 Aug. 1828; d. Atlantic City, N. J., 28 April 1903; son of the American Baptist missionary of the same name. He was educated in the United States, graduating at Brown University in 1852, and at Newton Theological Institution in 1855. He was pastor at Barnwell, S. C.; afterward at Rochester, N. Y., till 1864, when he became pastor of the First Baptist Church in Philadelphia. In 1899 he established a lectureship at the University of Pennsylvania, known as the "Boardman Foundation in Christian Ethics." Besides sermons and essays, his chief works are: 'Studies in the Creative Week' (1878); 'Studies in the Model Prayer' (1879); 'Epiphanies of the Risen Lord' (1879); 'Studies in the Mountain Instruction' (1880); 'The Kingdom' (1899); 'The Church' (1901); 'The Golden Rule' (1901).

Boardman, Richard, English missionary; b. 1738; d. Cork, Ireland, 4 Oct. 1782. He became a member of Wesley's conference in 1763, and volunteered for service in America in 1769. He preached in New York and through the Middle States till 1774, and then, returning to England, continued his itinerant ministry. He is known as one of the founders of Methodism in the United States.

Boarfish, a fish of the family *Caproidæ*, found off the southern coast of Europe. The body is small, oval, compressed, and carmine in color, with seven transverse orange bands on the back, and has a long, hog-like snout.

Boarhound. See **HOUND**.

Boar's Head, The, a tavern in Eastcheap, London, destroyed in the great fire of 1666; its site is now occupied by a statue of William IV. The inn figures in Shakespeare's 'Henry IV.' and 'Henry V.' as the resort of Falstaff and his boon companions.

Boas, **Franz**, frānts bō'as, German-American ethnologist; b. Minden, Westphalia, 9 July 1858. He studied at Heidelberg, Bonn, and Kiel universities, 1877-82; traveled in the Arctic regions, 1883-4; was assistant in the Royal Ethnographical Museum in Berlin, and privat docent in geography at the University in 1885-6; and teacher of anthropology in Clark University,



WILD BOARS (*Sus porcus*)

BOAT — BOBADILLA

Worcester, Mass., in 1888-92. In 1901 he became curator of the American Museum of Natural History. He has spent much time among various American Indian tribes, and, among other works, has published 'Baffin Land' (1885); 'The Central Eskimo,' in the 'Annual Report' of the United States Bureau of Ethnology (1888); 'Indians of British Columbia' (1888-92); etc.

Boat, properly a small vessel propelled by oars or poles. Boats are made of iron, copper, India-rubber, gutta-percha, skins, and of all kinds of wood. Wooden boats are usually built either smooth or lap-streak, that is, where the upper plank laps over the next lower. Boats differ much in shape and size, depending on the use to which they are to be put. Launch is the largest boat carried by a man-of-war. Long boat, used by merchant vessels for conveying heavy burdens; this name is given to the largest boat, without regard to size. Cutter, shorter and lighter than the launch, and much faster. Jolly boat, smaller than the cutter, and not so fast, used for going on shore, usually rowed with four oars. Gig, a fast-rowing boat nearly the size of the cutter, employed both in the merchant service and navy. Barge, in the English navy, about the size of the cutter. This name is given to the large boats used on occasions of state. On the Mississippi it means a scow, flat-bottomed, and of very light draught. Sometimes also applied to the large 8- and 10-oared race boats. Pinnace, smaller than the barge, used for conveying light articles. In the English navy the pinnace launch is next in size to the launch. Paddle-box boat, so called from the place where they are stowed, commonly built like a whale boat, and smaller than the cutter. Whale boat, a sharp, light boat, very wide amidships, bow and stern alike, rowed with six oars. All surf boats are whale-boat model, or modifications of it. Dory, light, flat-bottomed, very sharp, with sloping sides, from 15 to 20 feet long, used very extensively in the fisheries. Wherry, in the United States, a dory; in England, a race boat for one rower, and from 15 to 30 feet long. Skiff, a little boat for crossing rivers, or going on shore from a vessel. Cobble, a small fishing boat, flat-bottomed. Punt, a flat-bottomed, decked boat, of very light draught, used chiefly by gunners. Shallop, small ship's boat; term not now used. Scow, a broad flat-bottomed boat, with square bow and stern, for conveying heavy weights, propelled by poles or sweeps, from 30 to 50 feet long, and 12 to 18 feet wide. Canal boat, a broad shallow boat, like the scow, except in having a keel and a rather sharper bow, used only on canals. Flats, flat boats, arks, etc., boats resembling scows, save in being decked. They are still to be found on the Mississippi and its tributaries, and are used for bringing all kinds of produce down the river. Bateaux, boats smaller than the scow, and used in the same way. Gondola, in the United States, a scow; properly, a very sharp, fast boat, sculled with one oar. Moses, large flats, used in the West Indies for taking molasses hogsheads from shore to ship. Felucca, a large boat with lateen sails, decked, and rowing from 10 to 16 banks of oars. Life-boats, boats used in storms for saving life. (See LIFE-BOAT.) Dingy, a wooden life-boat, carried by a man-of-war, has

wooden air-chambers at each end, and is about 18 feet in length. Waist boats and quarter boats take their name from the part of the vessel where they are kept, and are somewhat smaller than the cutter. Race boats differ very much in shape from any of those before named. Having only speed in view, they are built as light, narrow, and sharp as possible. They are rowed with from 2 to 12 oars, and are from 15 to 70 feet in length, and generally not more than eight inches above water. The two-oared boats are called shells, sculls, or wherries; the larger ones sometimes barges.

Boatbill, a South American heron (*Concroma cochlearia*), having a remarkable bill, suggesting in its broad, inflated shape an up-turned boat, the keel of which is represented by the ridge of the culmen. The bird is about the size of a night-heron, but with shorter legs. Its general color is reddish-gray, with black and white markings. The back of the head and neck are covered with elongated, erectile feathers. A naked gular pouch hangs beneath the lower jaw. It feeds upon worms, crabs, and other small aquatic animals caught in muddy shallows. Another species (*Concroma selendom*) inhabits Central America.

Boat-fly (*Notonecta glauca*), an aquatic hemipterous insect which swims on its back; the hind-legs aptly enough resembling oars, the body representing a boat; hence the name. It frequents stagnant waters, swimming rapidly on the surface, but diving below whenever the water is disturbed. In color it is gray and black, with greenish elytra and white wings. The small insects which constitute its food are devoured in very large numbers. The female usually deposits the eggs on the stems and leaves of aquatic plants.

Boatswain Bird, or **Marlin-spike**, either of two species of a sea-wandering bird, so called because of the long, pointed feathers in its tail, which resemble a marlin-spike, the boatswain's badge of office. One is the skua-gull (*Stercorarius parasiticus*), and the other a tropic bird (q.v.).

Bo'az, a wealthy Bethlehemite, who took upon himself the duty of providing for Ruth, as the near relation of her dead husband, Elimelech. From him Jesus Christ was directly descended.

Bob-white. See QUAIL.

Bo'bac, a European and Central Asian gregarious marmot (*Arctomys bobac*), resembling the American woodchuck in habits and appearance, but smaller.

Bobadilla, **Francisco de**, frān thēs'kō dé bō-bā-dēl'yā, Spanish soldier: d. 29 June 1502. In the year 1500 he was selected as a commissioner to enquire into the condition of the new Spanish colony of Hispaniola, and especially into the complaints which had been made against the administration of Columbus (q.v.). He was entrusted with unlimited powers, which he immediately exercised by arresting Columbus, putting him in chains, and sending him to Spain. He next abolished the regulations which had been enacted by Columbus, and indulged the colonists in all the excesses of power, and, above all, in boundless oppression of the natives. The unexpected outrage upon the most noted man of the time excited general

BOBBIN—BOCAUE

indignation in Spain, and was regarded as a national dishonor. Orders were accordingly sent for the recall of Bobadilla, and when Columbus, now reinstated in his honors and emoluments, made his fourth landing in Hispaniola, the fleet bearing Bobadilla and other enemies of Columbus started for Spain. A fearful tropical hurricane wrecked the ships, and Bobadilla perished.

Bobbin, a reel or other similar contrivance for holding thread. It is often a cylindrical piece of wood with a head, on which thread is wound for making lace; or a spool with a head at one or both ends, intended to have thread or yarn wound on it, and used in spinning machinery (when it is slipped on a spindle and revolves therewith) and in sewing-machines (applied within the shuttle).

Bobbinet, a lace, with a hexagonal eyelet, manufactured by machinery, in imitation of the lace made on a pillow.

Bob'io, Italy, a small town in the province of Pavia, the seat of a bishop, with an old cathedral, and formerly a celebrated abbey founded by St. Columbanus, in the library of which was a famous collection of manuscripts now divided between the Vatican and the Ambrosian Library at Milan. The population of the commune is about 5,000.

Boboli (bō'bō-lē) **Gardens**, the grounds of the Pitti Palace at Florence, planned in 1550 by Eleanor of Toledo. They contain many fine statues and the Isoletto fountain, designed by Jean de Bologne.

Bobolina, bō-bō-lē'nā, a heroic Greek woman; d. 1825. Her husband was put to death at Constantinople in 1812 by order of the Sultan, and Bobolina vowed revenge. At the beginning of 1821 she fanned the flames of insurrection among the Greek population in Turkey, equipped at her own expense three ships, herself taking command of one bearing her flag, as admiral, and giving the others to competent captains, while her two sons fought against the Turks on land. In September 1821 she attended the siege of Tripolizza, to meet the Peloponnesian leaders there assembled. She put her ships at the disposal of the government and maintained the blockade of Nauplia for 14 months, until the Turks were forced to capitulate. She then proceeded, with a small Greek fleet, which was entrusted to her charge, to the coasts of Morea, and during the siege of Monemvasia, when one of her nephews lost his life, she did not even waste one hour upon him, but quietly drawing a cloak over his body, avenged his death by continuing to bombard the city. After the war she lived with her brothers at Spezzia. In 1825 her house was attacked by the friends of a young lady who was supposed to have been dishonored by some member of her family, and she was killed by a rifle shot fired by one of the assailants.

Bob'olink, an oriole of the family *Icteridae*, found in plains, prairie-lands, meadows, and cultivated fields throughout the entire United States, except on the Pacific coast. The male is 7.7 inches long, its tail taking up fully half of its length. It is distinguished from the black-birds and other orioles by its pointed tail-feathers, long middle toe, and variegated plumage. The male has two distinct sets of plumage, a summer or breeding dress, and a winter one.

The former dress is lustrous black, with the neck, scapulars, rump, and upper tail coverts buff, inclining to ochraceous on the neck, and ashy on the tail; the latter is similar to that of the female, who is protectively clothed in much-streaked yellowish-brown neutral tints; the young of both sexes also resemble her, until the young males reach maturity. The gay summer dress of the male, especially the black part, is due to the black margins upon the feathers that come in with the spring renewal of plumage. These edges wear away, and thus, as the season advances, the brownish centres of the feathers are gradually revealed. The song of the male is a varying melody, an incessant out-pour of ecstatic music, in which one detects distinctly enunciated the word "bob-o-link." Its excited manners are as peculiar as its song, which often bubbles out of its beak as it flutters and dances in mid-air. As the summer advances and the plumage changes, the song diminishes, and finally ceases altogether.

Their nests consist of grasses neatly and skilfully entwined, and ingeniously hidden among the stems and leaves of plants, and are guarded carefully and most jealously by the male, whose exuberant pride in the four or five dull-white, flecked, and marbled eggs is remarkable. The bobolink goes in summer as far north as the banks of the Saskatchewan, but is most plentiful in the northeastern States, where it renders good service by the destruction of insects and their larvæ. It begins to migrate southward in August, and assembles in huge flocks in early autumn in the great wild-rice marshes that border Delaware and Chesapeake bays and their rivers, where they fatten on the wild rice, and are shot in vast numbers for market, under the name of "reedbird." Later in the season these birds advance southward and assail the cultivated rice plantations, where they are known as rice-birds and would ruin the crops, partly by eating, but mainly by breaking the stalks and shaking out the grain, were they not constantly killed or scared away by thousands, by men and boys who are employed to shoot them. On their return from the tropics in the spring they also attack the young plants. In consequence of this necessary persecution in the rice fields the species has been seriously diminished of late years, and bobolinks are becoming rare in many parts of the United States and Ontario. On account also of their beauty and powers of song, many are caught, caged, and sold in the bird-stores.

Bobruisk, bō-brōō'esk, Russia, a fortified town in the government of Minsk, on the right bank of the navigable Beresina, at its junction with the Bobruisk, 108 miles southeast of Minsk, with which it is connected by rail. By steam navigation it is connected with stations on the Dnieper and the Beresina. The chief exports consist of timber and grain. The place was fortified by Alexander I., and the defenses were extended by Nicholas I., who raised it to the position of a fortress of the first rank. In 1902 an extensive conflagration nearly destroyed the town.

Bobs, a nickname given by English soldiers to Gen. Lord Roberts (q.v.).

Bocaue, bo-kow-a, Philippines, a town in the province of Bulacan, Luzon, situated a few miles east of Manila Bay, near the city of Bulacan, and near the railroad line.

Boccaccino, Boccaccio, bōk-kāchō bōk-kā-chē'nō, Italian painter: b. Cremona, 1460; d. 1518. Few details of his life are known. He came under the influence of Mantegna, and in his school in Cremona numbered Benvenuto Garofalo among his pupils. In 1497 he painted a series of frescoes in St. Agostino in his native city, but he is better known by his frieze in the cathedral. This represents the birth of the Virgin and various incidents in her life. Among his paintings are: 'Marriage of St. Catharine,' in the Venice Academy; 'Virgin and Two Saints,' in San Quirilo, Cremona, and a 'Holy Family,' in the Louvre, Paris. He committed suicide.

Boccaccio, Giovanni, jō-vān'ne bōk-kāch'ō, Italian novelist: b. 1313, in Paris or Florence; d. Certaldo, 21 Dec. 1375. His family was originally of Certaldo, but his father being engaged in commerce, removed to Florence, where he amassed wealth, and filled several important public offices. Very early in life Giovanni displayed a remarkable aptitude for learning, and before he was seven years old, composed verses with perfect facility. He was placed under the care of an eminent master, Giovanni da Strada, but his father having determined on a commercial career for his son, removed him from his tutor before his Latin course was completed, and as soon as he had acquired a sufficient knowledge of arithmetic apprenticed him to a merchant, with whom he remained six years. His master finding that he profited nothing, although he made in his company several commercial journeys, finally in despair sent him back to his father, and was accustomed to regard him as a very narrow-minded youth. His father discovering that his son would never make a merchant, thought that his studious habits might serve him in the legal profession. But the law proved as distasteful as commerce, and the father, finding that the law had little attraction for Giovanni, forced him to return to commerce, and fix his residence in Naples. The king, Robert of Anjou, a friend and patron of Petrarch, was greatly devoted to literature, and thus drew to his court the most eminent scholars of Italy. Boccaccio was well acquainted with Giovanni Barrili, a man of erudition, and Paolo of Perugia, the king's librarian, and excited by their example and encouragement, he entirely abandoned commerce and gave himself up to the pursuit of learning. His father gave his consent only on the condition that he should study the canon law, and although against his disposition, he applied himself to it for some time, took his doctor's degree, and after that found himself more at liberty to indulge his passion for poetry, while at the same time he devoted himself to the higher branches of philosophy, astrology, then a favorite study, and to the fathers of the Church. He remained eight years in Naples, and during his stay there was filled with desire of distinction by the visit of Petrarch on his way to Rome, where he had been decreed the honor of the laurel crown. Boccaccio marked with delight the splendid reception given to Petrarch, his examination of three days, his noble oration, and the applause which followed, but was far more pleased in after years to make the acquaintance of the illustrious poet, with

whom he formed a life friendship. Boccaccio was naturally fond of gay company, and fell in love with the princess Mary, illegitimate daughter of King Robert, and half-sister of the celebrated Joanna of Naples. She was married to a Neapolitan gentleman, but at once ardently returned Boccaccio's love and became his avowed mistress. At her instance, he composed his romance of 'Il Filocopo,' and 'L'Amorosa Fiammetta,' in the latter of which his lady, under the name of Fiammetta, bewails the loss of Pamphilo, supposed to represent himself. The 'Filocopo' is not skilfully constructed, and is filled with spectres and visions of every kind, and the powers of darkness are summoned before the reader to account for its scenes and incidents. Yet it contains passages of that wondrous grace and vivacity afterward so signally displayed in the 'Decamerone,' and touches of human nature in which the whole character is pictured in a single sentence. While thus employed at Naples he was suddenly summoned to Florence by the illness of his father. His separation from the princess Mary appears to have affected both lovers with violent sorrow, and it was only by the composition of the romance of 'Ameto' that he could console himself during his absence. His father's recovery and marriage set him again at liberty to return to the favors of his adored princess. He was not only happy from his connection with the princess Mary, but possessed the favor of Acciajuoli, who had great power in Naples, and even the regard of Queen Joanna herself. It is asserted on respectable authority that many of the most licentious passages in the 'Decamerone' were written in conformity with the taste and by the command of the queen. His father died in 1350, leaving a son by his wife Bice dei Bosticchi, who was also dead, to the care of Boccaccio. The poet faithfully attended to his trust, and becoming acquainted with Petrarch, the latter's example and influence began very shortly to act upon the mind of his younger friend, who from the date of their friendship commenced to turn his thoughts more from licentious pleasures to purer fame. Being now permanently settled in Florence, Boccaccio, by Petrarch's advice, began to take some interest in the affairs of state. His motives were appreciated, however, and he was sent on an embassy to Padua, to invite Petrarch to accept the presidency of the university. Several other missions followed, and in April 1353, he took part in one to Pope Innocent VI., the papal court then residing at Avignon. In the same year was published his 'Decameron' or '10 Days' Entertainment,' one of the most extraordinary works of genius ever written, and which after the lapse of five centuries is still regarded as one of the purest specimens of Italian prose, as an inexhaustible repository of wit, beauty, and eloquence, although unhappily deformed with licentious descriptions. While occupied with these popular compositions, Boccaccio did not lose sight of higher pursuits in literature. Like Petrarch he was a devoted collector of ancient manuscripts, and a diligent student of the classics. On one occasion Boccaccio visited Monte

BOCCAGE

Cassino, within whose monastery he knew many works had been collected, which had escaped the ravages of the barbarians, but found, to his amazement, that they were suffered to rot in a damp loft exposed to the weather, and that frequently when the monks were in want of money, they took some of the manuscripts, obliterated the writing, replaced it by copying on the parchment some part of the ritual, and then sold the new productions among the people of the neighborhood. To such collectors as Petrarch and Boccaccio, and to the latter pre-eminently, the world owes a debt of gratitude for the rescue of many of the great classic works which otherwise would have been irretrievably lost. In 1359 the author of the Decameron visited Petrarch at Milan, conversed with him, as he informs us, at great length on the subjects of morality and religion, and determined to devote himself more seriously to holy studies. This resolve received additional stimulus in 1362 from a singular circumstance. A monk from the Carthusian monastery at Sienna came to visit him, saying that he was charged with a message to him from Father Petroni, who on his death-bed, although he had never seen Boccaccio, declared that he knew him in spirit, and commissioned the monk to exhort him to repentance. In order to prove the truth of his words, the monk told Boccaccio of a circumstance in his life which the poet thought known only to himself. So great was the effect of this warning, that he determined to abandon poetry, sell his library, and lead a life of penance and meditation. With this view he wrote to Petrarch, supposing that his sudden purpose would meet with kindred enthusiasm, but his friend answered in a strong, common-sense letter, instructing him to receive the warning to repentance, but informing him that there was no necessity for selling his books or abandoning his studies. Boccaccio accordingly wrote in a strain altogether free from his former one, while he assumed the ecclesiastical habit, and applied himself to theology. With disinterested generosity a large part of his means was dissipated in the collection of Greek manuscripts, his emissaries visiting many parts of Europe to procure them. His fortune was thus gradually impaired, and toward the decline of life he found himself poor and deserted by all his friends, except the noble-minded and constant Petrarch. That great poet wished his friend to take up his abode with him, but Boccaccio preferred independence, and declined the offer, although he visited Petrarch whenever he found an opportunity. In 1363 he was invited to Naples by the grand seneschal Acciajuoli, but was so hurt by his cold reception, that he soon left and went to Venice to meet Petrarch. On returning to Florence he found its turbulent state of society in little accordance with his wish of retirement, and took up his abode in a little cottage in Certaldo, in the vale of Elsa, dear to him as the birthplace of his family. From this retreat he was soon summoned by the chief citizens of Florence, to undertake an embassy to Urban V. at Avignon, and repairing to the papal court he experienced the most flattering reception. He was again sent

to Urban in 1367, after the pontiff had removed to Rome, when the character of Boccaccio had so completely changed from his former looseness, that he was characterized by the bishop of Florence as one in whose purity of faith he had the utmost confidence. He was now honored by the Florentine magistrates with a professorship founded in memory of Dante, for the better explication of the 'Divina Commedia.' His lectures commenced in October 1373, and continued until his death, which was doubtless hastened by the demise of Petrarch 10 months before his own. In eloquent language he bewailed his loss. Boccaccio wrote numerous works in Italian and Latin, and both in prose and poetry, few of which are referred to at the present day; his great fame rests upon the Decameron. In these hundred tales of love, displaying the most wondrous fertility of invention, the reader is perpetually delighted with the beauty of the narrative and the variety of the scenes, whether of intrigue, wit, or pathos—no two stories, nor even their introductions, resembling each other. The author's fondness for involving friars in every imaginable scene of mischief and ludicrous mishap, created great scandal to the Church, and his famous romance, the tenth novel of the sixth day, in which "Friar Onion promises some country people to show them a feather from the wing of the angel Gabriel, instead of which he finds only some coals, which he tells them are the same that roasted St. Lawrence," drew down the solemn anathema of the council of Trent. The editions of the Decameron are almost innumerable, and translations exist in all the languages of Europe. The earliest editions are extremely rare, and of that of Valdarfer in 1471, only one copy is known. Boccaccio's poem, 'Il Teseide' is written in the *ottava rima*, of which he is usually considered as the inventor, and is the first Italian poem which presents a specimen of the *epoee*. Chaucer borrowed from this poem his 'Knight's Tale,' and Shakespeare a part of his 'Midsummer Night's Dream.' The great English dramatist has also, in some measure, availed himself of Boccaccio's Decameron, as in 'Cymbeline' and 'All's Well that Ends Well.' With all his faults, we may consider Boccaccio one of the great revivers of learning and a benefactor to mankind, as well as worthy of the third place in that great triumvirate with Dante and Petrarch, "which renders the 14th century so splendid an epoch in the history of literature." See Cochin, 'Boccaccio, études italiennes' (1890), Symonds, 'Giovanni Boccaccio as Man and Author' (1895).

Boccage, Marie Anne Fiquet du, mǎ-rě ǎn fě-kǎ dū bók-kǎzh (LE PAGE) French poetess: b. Rouen, 22 Nov. 1710; d. there, 8 Aug. 1802. She was educated in Paris, in a nunnery, where she discovered a love of poetry. Her first published work, a poem on the mutual influence of the fine arts and sciences, appeared in 1746, and gained the prize from the Academy of Rouen. She next attempted an imitation of 'Paradise Lost,' in six cantos; then of the 'Death of Abel'; next, a tragedy, 'The Amazons'; and a poem in 10 cantos, called 'The Columbiad.'

BOCCANERA — BOCHART

Madame du Boccage was praised by her contemporaries with an extravagance for which only her sex and the charms of her person can account. *Forma Venus, arte Minerva*, was the motto of her admirers, among whom were Voltaire, Fontenelle, and Clairaut. There is a great deal of entertaining matter in the letters which she wrote on her travels in England and Holland. She was a member of the academies of Rome, Bologna, Padua, Lyons, and Rouen. Many of her works have been translated into English, Spanish, German, and Italian.

Boccanera, Simone, sê-mô'nâ bôk-kâ-nâ'râ, first doge of Genoa: d. 1363. He was born of an illustrious noble family, but early took part with the democratic party and gained great popularity by undertaking the defense of the people against the nobles. During a commotion caused by the severity with which Philip of Valois had punished a mutiny on board some Genoese galleys in the service of France, the people wished to appoint Boccanera their abbé, an office which appears to have been similar to that of the tribunes at Rome. Boccanera declined to accept, on the ground that his noble birth would not allow him to become a plebeian magistrate. The excuse only made the people more determined to place him at their head and as he would not be abbé they by acclamation hailed him doge. The office, thus introduced into Genoa for the first time in 1339, was exercised by Boccanera till 1344, when the ascendancy of a faction opposed to him obliged him to abdicate and retire to Pisa. He afterward regained the office in 1356, and had held it for seven years, when his enemies succeeded in destroying him by poison.

Boccherini, Luigi, loo-ê'jê bôk-kâ-rê'nê, Italian composer of instrumental music: b. Lucca, 14 Jan. 1740; d. Madrid, 28 May 1805. He received his first instruction in music and on the violoncello from his father and the Abbé Vannucci, music-master of the archbishop. He further improved himself in the art at Rome, and afterward went, with Filippo Manfredi, his friend and countryman, to Spain, where he met with but indifferent patronage, and latterly suffered greatly from indigence. Previous to 1797 the king of Prussia, Frederick William II., who was a great lover of the violoncello and admired Boccherini's compositions, had paid him a pension on condition of his sending him yearly some of his quartets and quintets. The compositions which Boccherini published himself consist of symphonies, sestet, quintet, quartet, trios, duets, and sonatas for the violin, violoncello, and pianoforte. He never composed anything for the theatre; and of church compositions we find but one, his 'Stabat Mater.' The adagios of Boccherini excited the admiration of the connoisseurs and the despair of the composers of his time. He may be regarded as a sort of minor Haydn, and he was the first who wrote instrumental quartets, of which all the parts are *obbligato*, and determined the true character of this species of music. His melodies are more highly esteemed in England, France, and Spain than in Germany.

Bocchetta, bôk-kê'tâ, Italy, a pass of the Apennines, leading from Lombardy to Genoa, and traversed by the road from Novi. In the Austrian war of succession (1746-7), and in the

French wars toward the end of the 18th century, it was the scene of several important events.

Bocconia, or Plume Poppy, a genus of four or five species of plants of the natural order *Papaveraceae*. *P. cordata*, a native of Japan and China, is the only species of special merit. It is a hardy perennial herb with large leaves similar to those of bloodroot, and small usually pinkish apetalous flowers borne in large terminal panicles rising like spires from four to eight feet above the dense foliage. Where known, it is a favorite in borders and shrubberies and is also largely used upon lawns for its remarkable appearance. It is very much sought by bees, and should prove a valuable bee-forage, since it will thrive almost anywhere. It is readily propagated by seeds, divisions of the root, and by suckers. If set in rich soil the plants will attain the greatest size and attractiveness.

Bochart, bô-shâr, Samuel, French divine: b. Rouen, 1599; d. Caen, 16 May 1667. He was son of a Protestant minister descended from an illustrious family, and gave proof of precocious talents by composing, at the age of 14, a Greek poem in praise of his master, Thomas Dempster, who was so much pleased with it that he published it at the head of his work on Roman antiquities. He afterward studied philosophy and theology at Sedan, visited England and Leyden, and, returning to France about 1628, became Protestant minister of Caen, a post which he held till his death. Shortly after, a Jesuit of the name of Veron, who had been specially trained to controversy, and had received a diploma entitling him to travel the country and debate the points of difference between the Protestant and Roman Catholic churches, challenged Bochart to a discussion. It took place in 1629, in the castle of Caen, in presence of the Duc de Longueville, governor of Normandy, and a large assemblage of nobility and gentry, and had continued for 11 days, when Veron, without waiting to bring it to a close, judged it prudent to take his departure. The debate was published by Bochart under the title of 'Actes de la Conférence Tenue à Caen.' His next work, entitled 'Geographia Sacra seu Phaleg et Chanaan,' added so much to his reputation that Christina, queen of Sweden, sent him a letter in her own hand, inviting him to Sweden. He accepted the invitation, and had for his traveling companion the celebrated Huetius, afterward Bishop of Avranches, and author of an excellent work on the Christian evidences, entitled 'Demonstratio Evangelica.' On his return to Caen in 1653 he learned that an academy had been founded there in his absence. He immediately joined it, and was afterward one of its most distinguished members. Bochart's next great work is entitled 'Hierozoicon, or an Account of the Animals mentioned in Scripture.' It was scarcely completed when its distinguished author, while addressing the academicians of Caen, was struck with apoplexy and died almost instantaneously. His health had previously given way under grief for the loss of a daughter, his only child. Besides the works above mentioned, he wrote several others, among which is a 'Letter to Dr. Morley,' written, it is said, at the request of King Charles II., and discussing three important questions — De Presbyteratu et Episcopatu; De Provocatione a Judiciis Ecclesiasticis; De

BOCHNIA — BODENSTEDT

Jure et Potestate Regum. Bochart's principal works are still standards on the subjects of which they treat.

Bochnia, bōh'nē-ā, Austria, a town in the government of Lemberg, Galicia, near the Raba, 25 miles east-southeast of Cracow. It is tolerably well built, with several churches, a gymnasium, a grammar and other schools, and a board for the regulation of mines and saltworks. The salt mines here employ 500 persons, and yield 15,000 tons per annum. Pop. about 9,000.

Bochum, bōh'oom, Prussia, a town in the government of Arnsberg, province of Westphalia, five miles east-northeast of Essen and between 20 and 30 miles northeast of Düsseldorf. It is on the railway from Dortmund to Duisburg, and has manufactories of iron, steel, hardware, carpets, tobacco, etc. Pop. about 65,980.

Bock, Jerome, German botanist, better known under his Latin name of CRAGUS: b. Heidesbach, 1498; d. Harnbach, 1554. He was a schoolmaster, and then a physician. Bock may be considered as one of the founders of modern botany; he was the first who endeavored to form a natural botanical arrangement. He is the author of a *Herbal of German Plants*.

Bock, Karl Ernst, German anatomist: b. Leipsic, 1809; d. 1874. He studied at the University of Leipsic and at the outbreak of the Polish revolution he went to Warsaw, where he acted as hospital physician, first in the Polish service and later in the Russian. On his return home he was elected extraordinary professor in the University of Leipsic. His works attained popularity and have been translated. His title to fame rests chiefly on his *'Handbook of Human Anatomy.'*

Bock Beer, a strong beer, the first drawn from the vats in the spring, when the winter's brew of lager beer is broached. See BEER; BREWING.

Böcklin, bérk-lin, Arnold, German painter: b. Basel, 16 Oct. 1827; d. 1901. He studied at the Düsseldorf Academy and also at Brussels, Paris, and in Italy, devoting himself mostly to landscape painting. A contract to decorate the dining-hall of a villa summoned him to Hanover; in 1856 he went to Munich, where Count Schack became his patron. In 1858 he became teacher in the art school at Weimar; in 1866-71 he was in Basel; in 1871 he returned to Munich and lived also in Zurich and Florence. He is in the first rank of landscape painters, showing a real poetic power and wealth of coloring, yet his most poetical conceptions in landscape painting are often marred by the figures introduced. Among his most notable paintings are *'Venus Reposing'*; *'Pan in the Rushes'*; *'Castle by the Sea Surprised by Corsairs'*; *'Villa by the Sea'*; and *'The Isle of the Blessed.'*

Bocland, Bockland, or Book-land, one of the original English modes of tenure of manorland which was held by a short and simple deed under certain rents and free services. This species of tenure has given rise to the modern freeholds.

Bocskay, böch'kō-ē, Stephen, Hungarian national leader: b. 1556; d. 1606. In 1604, when the Emperor Rudolf II. attempted to suppress

Protestantism in Hungary, a rebellion broke out, and Bocskay joined the malcontents and became their leader. He was well supported by the people, drove back the emperor's troops, and was made Prince of Transylvania. In 1606 he concluded the Peace of Vienna with the emperor, and this secured religious freedom to Hungary for a long time.

Bode, Johann Ehlert, yō'hän ā'lèrt bō'dā, German astronomer: b. Hamburg, 19 Jan. 1747; d. 23 Nov. 1826. He gave the first public proof of his knowledge by a short work on the solar eclipse of 5 Aug. 1766. The approbation which this received encouraged him to greater labors, and in 1768 appeared his *'Introduction to the Knowledge of the Starry Heavens'* (9th ed. 1822). In 1772 the Berlin Academy chose him their astronomer, and 10 years afterward he was made a member of that institution. His best works are his *'Astronomical Almanac'* (commencing 1774),—a work indispensable to every astronomer,—and his large *'Celestial Atlas'* in 20 sheets, in which the industrious editor has given a catalogue of 17,240 stars (12,000 more than in any former charts). In 1825 he was released, at his own wish, from his duties in the Academy of Science and the observatory in Berlin. His place was filled by Professor Encke. His empirical law as to the distance of the planets is well known. See BODE'S LAW.

Bode's Law, an empirical law formulated by the German astronomer Bode (q.v.) to give the arithmetical relation subsisting between the distances of the planets from the sun. It may be thus stated: Write, in the first instance, a row of fours, and under these place a geometrical series beginning with 3, and increasing by the ratio of 2; putting the 3 under the second 4; and by addition we have the series 4, 7, 10, etc., which gives nearly the relative distances of the planets from the sun.

4	4	4	4	4	4	4	4	4	4
4	3	6	12	24	48	96	192	384	
4	7	10	16	28	52	100	196	388	

Thus, if 10 be taken as the distance of the earth from the sun, 4 will give that of Mercury, 7 that of Venus, and so forth. The actual relative distances are as follows, making 10 the distance of the earth:

Mercury	Venus	Earth	Mars	Asteroids	Jupiter	Saturn	Uranus	Neptune
3.9	7.2	10	15.2	27.4	52.9	95.4	192	300

Close as is the correspondence between the law and the actual distances, no physical reason has been given to account for it, although there is little room for doubt that such exists. Kepler was the first to perceive the law, and Bode argued from it that a planet might be found between Mars and Jupiter, to fill up the gap that existed at the time in the series. The discovery of the planetoids has proved the correctness of this prediction.

Bodenstedt, Friedrich Martin von, frē'drīx mār-tēn fōn bō'dēn-stēt, German poet and miscellaneous writer: b. 1819; d. 1892. He studied at Göttingen, Munich, and Berlin, and became tutor to the young Prince Gallitzin at Moscow. Having obtained an educational appointment at Tiflis he published a work on the peoples of the Caucasus (1848), and *'A Thou-*

sand and One Days in the East' (1849-50), which were very successful. In 1854 he was appointed professor of Slavic at Munich, and in 1858 was transferred to the chair of Old English. He subsequently was theatrical director at Meiningen, and traveled and delivered lectures in the United States. Among the best of his poetical works are the 'Songs of Mirza-Schaffy,' purporting to be translations from the Persian, but really original, which have passed through more than 150 editions. He published translations from Marlowe, Ford, Webster, and other contemporaries of Shakespeare, translated Shakespeare's 'Sonnets,' and with other writers joined in a new translation of Shakespeare's dramatic works (1866-72, 9 vols.).

Bodie, or *Body's Island*, an island of sand between the Atlantic Ocean and Albemarle and Roanoke sounds. The sand shifts often, and inlets from the ocean appear and disappear. There is a lighthouse with a first-class light on the island.

Bodieron, bō-dī-ē'rōn, a fish (*Hexagrammus lagocephalus*) of Puget Sound, similar to the rock-trout (q.v.), but having greenish-colored flesh.

Bodin, Jean, zhōn bō-dān, French political writer: b. Angers, 1529 or 1530; d. Laon, 1596. He studied law at Toulouse; delivered lectures on jurisprudence there, and afterward went to Paris and practised. Being unsuccessful in his profession, he turned his talents to literary labors; was invited by Henry III. to his court; and afterward traveled with the king's brother, Francis, Duke of Alençon and Anjou, to Flanders and England, where he had the gratification of hearing lectures in Cambridge on his work, 'De la République,' originally written in French, but afterward translated by Bodin himself into Latin. He died of the plague.

Bodkin, Matthias M'Donnell, Irish novelist and journalist. He has written 'Poteen Punch'; 'Pat o' Nine Tales'; 'The Rebels'; 'White Magic'; etc.

Bod'kin, (1) an instrument used by women of ancient times to fasten the hair, worn at the back of the head; (2) a sharp instrument for piercing holes in cloth; (3) a blunt instrument with an eye, for drawing tape, etc., through hems; (4) a small tool used by printers.

Bodle, a copper coin formerly current in Scotland, of the value of two pennies Scotch, or the sixth part of an English penny. It is said to have been so called after a mint master named Bothwell.

Bodleian (bōd-lē'an) **Library**, the public library of the University of Oxford, so called from Sir Thomas Bodley (q.v.) who restored it toward the close of the 16th century, many of the previous collections of books and manuscripts having been destroyed during the reign of Edward VI. Beside restoring the building and providing a fund of \$10,000 for the purchase of books, he also presented a collection which was valued at \$50,000, and left an estate for the maintenance of officers and for keeping the library in repair. For the government of the library he drew up some statutes, which were afterward incorporated with those of the University. The library was first opened to the public 8 Nov. 1602. The liberal example of Bodley was soon followed by the Earl of Essex, who

presented part of the Portuguese bishop Osorius' library, which had been captured by Essex in 1596, shortly after the expedition against Cadiz. After the death of Bodley, the Earl of Pembroke added a valuable collection of Greek manuscripts procured by Baroccio, a Venetian. At later dates Sir Thomas Roe, Sir Kenelm Digby, the 'learned Selden,' Gough the antiquary, and Archbishop Laud, made donations of valuable Greek, Oriental, and German manuscripts to this magnificent library. The library of the Hebrew scholar Oppenheim, rich in rabbinical lore, a great collection of Eastern manuscripts, of early editions of the Bible, original editions of ancient and classic authors, together with 50,000 dissertations by members of foreign universities, and an extensive collection of medals, coins, prints, etc., were also subsequently deposited in this library. In 1809, Clarke, the traveler, gave to it some rare Greek and Latin manuscripts, including a 'Plato' from the Isle of Patmos. In 1818 an exceedingly valuable collection of Hebrew, Greek, and Arabic manuscripts procured from Venice, was added, together with a portion of the famed library of Richard Heber (1834), and lastly, the rare books, manuscripts, and coins of the scholar, antiquary, and Shakespearean commentator, Francis Douce. This renowned library, in fine, is rich in many departments in which other libraries are deficient, and forms altogether the noblest collection of which any university can boast. It is constantly increasing by donations, by copies of every work printed in the United Kingdom, as well as by books purchased from the fund left by Bodley, by fees received at matriculation, and by an annual payment of all persons (servitors excepted) who have the right of admission to the library. It is now estimated to contain upward of 500,000 bound volumes, and between 30,000 and 40,000 manuscripts. The first catalogue of the printed books was issued by Dr. James in 1605.

Bodley, Sir Thomas, English scholar, and founder of the Bodleian Library (q.v.) at Oxford: b. Exeter, 1544; d. London, 1612. He was educated partly at Geneva, whither his parents, who were Protestants, had retired in the reign of Queen Mary. On the accession of Elizabeth they returned home, and he completed his studies at Magdalen College, Oxford. He afterward became a Fellow of Merton College, and read lectures on the Greek language and philosophy. He went to the Continent in 1576, and spent four years in traveling. He was afterward employed in various embassies to Denmark, Germany, France, and Holland. In 1597 he returned home and dedicated the remainder of his life to the re-establishment and augmentation of the public library at Oxford. This he accomplished, procuring books and manuscripts himself, both at home and abroad, at a great expense, and by his influence and persuasion inducing his friends and acquaintances to assist in his undertaking. Sir Robert Cotton, Sir Henry Savile, and Thomas Allen the mathematician, were among the principal contributors on this occasion. The library was so much augmented that Sir Thomas Bodley, who was knighted at the accession of James I., was induced to erect an additional structure for the reception of

the increasing quantity of valuable books and manuscripts. He was interred in the chapel of Merton College, in the university. He bequeathed nearly the whole of his property to the support and augmentation of the library. See 'Reliquiæ Bodleianæ' (London, 1703).

Bodmer, Georg, gā-orn bōd'mār, Swiss mechanic: b. Zürich, 6 Dec. 1786; d. Zürich, 29 May 1864. He invented the screw and cross wheels; and made valuable improvements in firearms and in various kinds of machinery, particularly in that of wool-spinning.

Bodmer, Johann Jakob, yō'hān yā'kōb, German poet and scholar: b. Greifensee, near Zürich, 19 July 1698; d. Zürich, 2 Jan. 1783. Although he produced nothing remarkable of his own in poetry, he helped to open the way for the new German literature in this department, which was then in a low and barbarous state. He was the antagonist of Gottsched in Leipsic, who aspired to be the literary dictator of the day, and had embraced the French theory of taste, while Bodmer inclined to the English. He has the honor of having had Klopstock and Wieland among his scholars. Bodmer was for a long time professor of history in Switzerland. He was a copious and indefatigable writer, though he entertained many incorrect views.

Bodoni, Giambattista, jām-bāt-tēs'tā bō-dō'nē, Italian printer: b. Saluzzo, Piedmont, 1740; d. Padua, 29 Nov. 1813. His father owned a printing establishment at Saluzzo, and he began, while yet a boy, to employ himself in engraving on wood. His labors meeting with success, he went in 1758 to Rome, and was made compositor for the press of the Propaganda. By the advice of the superintendent he made himself acquainted with the Oriental languages, in order to qualify himself for the kind of printing required in them. He made himself of great service to this press by restoring and putting in place the types of several Oriental alphabets which had fallen into disorder. The Infante, Don Ferdinand, about 1766, had, with a view of diffusing knowledge, established a printing-house in Parma, after the model of those in Paris, Madrid, and Turin. Bodoni was placed at the head of this establishment, which he made the first of the kind in Europe, and gained the reputation of having far surpassed all the splendid and beautiful productions of his predecessors in the art. The beauty of his type, ink, and paper, as well as the whole management of the technical part of the work, leaves nothing for us to wish; but the intrinsic value of his editions is seldom equal to their outward splendor. His Homer is a truly admirable and magnificent work; indeed, his Greek letters are the most perfect imitations of Greek manuscript that have been attempted in modern times. His splendid editions of Greek, Latin, Italian, and French classics are highly prized. He was a member of several academies of Italy and knight of several orders.

Body and Mind, in philosophy, the problems of the reality of mind and body, and of

the relations conceived to exist between them. Mind and body, positing temporarily their reality, may first be regarded from the point of view of correlated action. Generally experience reveals indisputably the intimate relation which exists between the constitution and modifications of bodily functions and the character and alterations of consciousness. Consider the following: the dependence of certain forms of consciousness upon the functioning of the senses; modifications due to injury by a blow, or lesion in the cerebral cortex; effect of loss of sleep upon attention; effect of the use of certain drugs; pleasures and pains resulting from functioning of sense; feeling of effort which accompanies bodily work; the phenomena of sleep; diseases of memory and will, double personality; phenomena of hypnotism, hallucination, etc.; the evidence from heredity, sexual differences, and other allied phenomena. All these, as facts, afford an indisputable conclusion concerning the correlated action of mind and body.

But difficulties arise as soon as we undertake to state the nature of the relations which exist between them. The general truth which the phenomena referred to appear to establish, that every psychosis has its concomitant neurosis and every neurosis a concomitant psychosis, is not entirely borne out in fact. The former part of the statement is indubitable; the latter by no means so. Mental activity always involves nervous activity, but the nervous system does work other than that connected with mind. Moreover the precise interconnections of mental fact with cerebral fact, and *vice versa*, is not only not known, but the specific character of the neurosis concomitant with the psychosis is perhaps impossible of final analysis. But until these phenomena are understood, the nature of the relations of body and mind cannot be finally determined. However, physiological psychology has successfully established certain general conclusions concerning the existence of uniform relations between concomitant psychical and neural processes. The most obvious of these is the time-order or synchronous occurrence of the two series of events. The remainder are concerned, in the main, with variations of intensity, quality, combination, and complexity. Qualitative psychical differences, however, are not accompanied by corresponding differences of molecular movement. These are quite different from the corresponding sensational differences.

Philosophical systems, from the days of Greek thought (see ANAXAGORAS; ARISTOTLE) down to the present, have taken up the problem where psychology leaves off. These systems may be divided into dualism and monism. According to dualism, the first and crudest theory of which was promulgated by Descartes, both mind and body are real existences, and their relations must accordingly be determined. The problem assumes two forms, the epistemological and the genetic. According to the former of these a knowledge of both body and mind is posited. Various theories concerning their interaction then arise, such as the causal relation, parallelism, pre-established harmony, and occasionalism. The first of these is not only the most important, but the philosophical conceptions concerning it may be said to strike

at the inmost heart of the problem, and their assumption determine the acceptance or rejection of general theories. Physiological psychology has demonstrated the temporal concomitance of the psychosis with the intermediate central portion of the neurosis. But we have certain neuroses revealing physiological processes devoid of conscious concomitant. Now, the question arises: How may this partial parallelism be accounted for? Is there a causal relation such as our initial phenomena seemed to indicate, or have we only the appearance of it in a general parallelism? Science has failed to afford precise answers to these questions. According to it the series of nervous events is complete in itself and self-sufficient. Hence, since antecedent events fully account for consequent ones, consciousness can have no causal action upon the neural series. Consciousness, then, is a mere accident and without determining power in any series. This gives us the doctrine of human automatism, according to which all our nervous actions are determined, and consciousness is an unnecessary attachment. On the other hand, others regard psychical phenomena as having a reality equal to that of physiological phenomena. They acknowledge, generally, the conditioning effect of nervous processes upon mental ones, but they divide again on the question of the reality of causal connection. Finally the genetic view traces its distinction of mind and body upon the dualism which a developmental theory in general appears to demand; or it accepts it as an hypothesis, uncritically examined, but convenient for practical purposes.

It is the attempted unification of mind and body which brings us to the doctrine of monism. Under this general theory we find spiritual monism, materialism, panpsychism, epiphenomenon, mind-dust, etc. The most obvious means of reconciliation is that of resolving either one of the ultimate factors into the other. The metaphysical conception of materialism is the doctrine by which all substance whatsoever is conceived of as being reduced to matter, of which conscious mind is but a product. The chief objections urged against it are: (1) that it makes our mental states, which of all knowledge we know most immediately and directly, subordinate to our indirect and inferential knowledge of things; (2) that consciousness is a reality distinct from material phenomena, and therefore incapable of being analyzed into it; and (3) that no external world is possible apart from a perceiving subject. Spiritualism, on the other hand, escapes these objections by positing mind as the primordial substance, and further regarding material things as in themselves essentially expressive of spirit. It encounters, however, certain difficulties in the concomitance and juxtaposition of its elements for which, as yet, it has afforded no adequate solution.

According to Spinoza's doctrine of monism, both spirit and matter, or the mental and the material, are posited as real, self-existent realities, but not standing independent of each other. There is a common "substance," and in this, consciousness and extension, the fundamental attribute of external reality, find themselves connected. Hence the doctrine is neither purely materialistic nor purely spiritualistic, but in-

cludes both these theories. The parallelism which physiological psychology demonstrates, then, in the two classes of phenomena, indicates not only their ultimate inseparability, but the fact that they are but different modes of manifestation of a common substance. Manifestly, then, this doctrine calls for no interaction theory and disposes of the troublesome question of causal connection above referred to. There is no interaction, merely a parallelism. This parallelism, indeed, extends throughout all material objects, all of which thus assume a certain *mental* aspect also. It is at this point especially that monism parts company, in its speculation, from the teachings of non-speculative psychology, according to which mind and consciousness are invariably co-extensive.

Bibliography.—Bain, 'Mind and Body'; Höttding, 'Psychology,' II.; Ladd, 'Elements of Physiological Psychology,' Pt. III.; Wundt, 'Physiological Psychology,' c. XXIV.; Wentzsch, 'Physische und Psychische Kausalität' (1896); Rehmke, 'Aussenwelt und Innenwelt' (1898); 'Psychological Review,' III (1896).

Body Color, a term applied to such pigments as have body enough to be opaque, as distinguished from those which are transparent. As a rule, pigments have more body the nearer they approach to white; consequently the light parts of pictures in oil are in body color to give them brightness and strength, while the dark parts are transparent to give them depth. Water color painting, when executed by mixing the pigments with water after the manner of an oil painting, is said to be painted in body color.

Body of Liberties. See LAW.

Body-snatching. See CORPSE.

Boece, *bois*, *Boeis*, or *Boyce*, *Hector*, Scottish historian: b. Dundee, about 1465; d. 1536. Boece studied at Dundee, and then at the University of Paris, and became professor of philosophy in the College of Montaigu. Here he became acquainted with Erasmus, who professed a high esteem for him. About 1500 Boece quitted Paris to assume the principalship of the newly founded University of King's College, Aberdeen. He was also made a canon of Aberdeen. The death of his patron in 1514 occasioned his first work—a history of the prelates of Mortlach (the original see) and Aberdeen, including the life of Bishop Elphinstone, which occupies about a third of the volume. It has been reprinted by the Bannatyne and New Spalding clubs. Five years afterward appeared the work on which his fame chiefly rests, the 'History of Scotland.' The first edition is without date, but a commendatory epistle bears the date of 1527. It was written in Latin. He is distinguished by a patriotic zeal to magnify the achievements of his countrymen, and by an enlightened love of political liberty in advance of the age in which he lived. In 1527 Boece received an annual pension of 50 pounds (Scots), which was to be continued "until the king should promote him to a benefice of 100 marks Scots of yearly value." The pension was paid till 1534, when it is supposed he received the promotion—a very unsafe

inference. The rectorship of Tyrie, which he held at his death, is, however, supposed to have been the promotion in question.

Boeckh, August, ow'goost bék, German classical scholar: b. Carlsruhe, 24 Nov. 1785; d. Berlin, 3 Aug. 1867. In 1803 he entered the University of Halle, where he was induced by the influence of Wolf to devote himself to the study of philology. After spending three years here, and more than a year in Berlin, he returned in 1807 to his native state, and in the same year became extraordinary, and two years later ordinary professor in the University of Halle. He had already acquired such renown as a scholar, that in 1810 he was offered the chair of rhetoric and ancient literature in the newly founded University of Berlin; and here he remained enjoying this and other important offices and dignities for the rest of his life. The works of Boeckh have made an epoch in the history of philology and archæology. In his studies of classical antiquities he set forth the principle that philology ought to be an historical method intended to reproduce the whole social and political life of any given people during a given period; and in accordance with this he divided the science into two parts: (1) Hermeneutics and Criticism; (2) the Practical and Theoretical Life of the Ancients. His views were vigorously attacked in various quarters, but the majority of German scholars gathered around him, and he himself carried his views into effect in a number of important works. The most remarkable of these are the following: an edition of Pindar; 'The Public Economy of the Athenians,' which has been translated into English; 'Metrological Investigations of the Weights, Coins, and Measures of Antiquity,' and 'Documents Concerning the Maritime Affairs of Attica.' Besides these he was uninterruptedly engaged from 1815 to the end of his life in making a collection of Greek inscriptions, which he published with the title 'Corpus Inscriptionum Græcarum,' and the first four volumes of which appeared at Berlin between 1824 and 1862. The first three volumes of a collection of his minor works, edited by Ascherson, appeared during the lifetime of the author.

Boehler, bè-lér, Peter, Moravian bishop: b. Frankfort-on-the-Main, 1712; d. London, 1775. He was educated at Jena, joined the Moravians and was ordained to the ministry. He was sent as a missionary to America, working among the negroes in Georgia, the Germans in North Carolina (who later settled Bethlehem, Pa.), and the Indians of Pennsylvania. He went to Europe and returned to Bethlehem with a large number of colonists. In 1742, he was made bishop of the Moravian churches in America, England, Ireland, and Wales.

Boehm, bém, Henry, clergyman: b. Conestoga, Pa., 8 June 1775; d. near Richmond, Staten Island, 28 Dec. 1875. Under the influence of Bishop Asbury, Boehm, whose father was a Mennonite clergyman, became an itinerant minister of the Methodist Church. In this capacity he traveled over 100,000 miles on horseback between the years 1800 and 1842, when he was stationed at Staten Island

as a supernumerary. He served 74 years in the ministry, and at the time of his death was the oldest Methodist minister in America. A special service in honor of his 100th birthday was held 8 June 1875. He wrote 'Reminiscences, Historical and Biographical, of Sixty-four Years in the Ministry' (N. Y. 1865; new ed. 1875, ed. by J. B. Wakeley and others).

Boehm, Sir Joseph Edgar, Hungarian-English sculptor: b. Vienna, 1834; d. 12 Dec. 1890. He went to London in 1862, and lived there from that date, becoming a member of the Royal Academy in 1881. Among his important works are the great statue of Queen Victoria at Windsor; statues of Bunyan at Bedford; Wellington at Hyde Park Corner; Dean Stanley at Westminster Abbey; Drake at Plymouth; Carlyle on Thames Embankment, and busts of Ruskin, Gladstone, and Huxley. In 1889 he was knighted. He was the fashionable sculptor of his time, but much of his work fails to reach a high standard and his designs for the jubilee coinage of 1887 were very adversely criticised.

Boehmeria, a large genus of plants of the natural order *Urticaceæ*, natives of tropical Asia, where various species furnish fibres used in rope-twine-thread-and cloth-making. *B. nivea* (China grass) is a nettle-like, but non-stinging perennial herb which is propagated by seeds or root division. When once established three crops are obtained annually and the fibre removed by hand stripping, machinery, or boiling in water or chemical solutions. None of these methods are wholly satisfactory; for which reason China and India, those lands of cheap hand labor, still supply the world. The fibre is used to make China-grass cloth. *B. tenacissima* (ramie) (q.v.) or rhea, is considered by some botanists as a variety of *B. nivea*. Attempts to establish the China-grass and ramie industries in the United States have not been very successful; not because the plants cannot be raised economically, but because of the high price of labor in manufacture, and the inefficiency of machines and degumming methods. Both species and several others of the genus are effective ornamental plants in borders and are hardy as far north as Washington, probably farther. Consult: Dodge, 'Descriptive Catalogue of Useful Fibre Plants of the World'; Royle, 'Fibrous Plants of India.'

Bœotia, bē-ō'shī-ā, a country of ancient Greece, bounded north by Phocis and the country of the Opuntian Locrians; east by the Euripus, or Strait of Eubœa; south by Attica, Megaris, and the Alcyonian Gulf, and west by Phocis. Its surface is estimated at 1,119 square miles; but the boundaries were not always the same. In the north it is mountainous and cold, and the air is pure and healthy, but the soil is less fertile than that of the other portion, which, however, is said to suffer from malaria. The mountainous part in the north was called in earlier times Aonia. Among the mountains of Bœotia are several remarkable in history and mythology—Helicon (now Zagora), the mountain of the Sphinx, the Teumessus, Libethrium, and Petrachus. Hypatus (modern name Samata), bounded the Theban plain on the

east. A feature of the country was Lake Copais, the district around which is a valley completely surrounded by hills, and connected with the Euboean Sea by subterranean passages. The lake was fed by the Cephissus, the largest river in the country, and the water was liable to accumulate more rapidly than the natural drainage of the country could carry it off. Hence the early inhabitants suffered much from inundations, and at a period previous to historical annals subterranean channels were built to carry off the water, which indicate a very early civilization, and recognized from the ruins which still remain as among the greatest works of antiquity. These works made Bœotia one of the most fertile districts of Greece. Recently the lake has been drained at great expense and a large tract of land reclaimed. The chief occupation of the inhabitants was agriculture and the raising of cattle. Bœotia was first occupied by the Pelasgian tribes. In the time of Bœotus (son of Itonus, and grandson of Amphictyon, from whom it is said to have derived its name) these were subject to the Hellenes. It was divided into small states, until Cadmus the Phœnician founded the government of Thebes. In later times all Greece worshipped the Hercules of Thebes. After the death of Xanthus, king of Thebes, most of the cities of Bœotia formed a kind of republic, of which Thebes was the chief city. Epaminondas and Pelopidas raised Thebes for a time to the highest rank among Grecian states. In Bœotia are several celebrated ancient battlefields, namely, Plataea (now the village Kokla), where Pausanias and Aristides established the liberty of Greece by their victory over the 300,000 Persians under Mardonius; Leuctra (now the village Parapogia), where Epaminondas checked the ambitious Spartans; Coronea, where the Spartan Agesilaus defeated the Thebans; and Chæronea (now Capranu), where Philip founded the Macedonian greatness on the ruins of Grecian liberty. Near Tanagra, the birthplace of Corinna, the best wine was produced; here, also, cocks were bred of remarkable size, beauty, and courage, with which the Grecian cities, passionately fond of cock-fighting were supplied. Refinement and cultivation of mind never made such progress in Bœotia as in Attica. The Bœotians were vigorous, but slow and heavy. Several Thebans, however, were worthy disciples of Socrates, and Epaminondas distinguished himself as much in philosophy as by his military talents. The people were particularly fond of music, and excelled in it. They had also some great poets and artists. Hesoid, Pindar, the poetess Corinna, and Plutarch, were Bœotians.

Boerhaave, Hermann, hêr'man boor-hâ-vé, Dutch physician: b. Woorhout, near Leyden, 13 Dec. 1668; d. 23 Sept. 1738. Boerhaave received from his father a liberal education. In 1682 he was sent to Leyden to study theology. Here he gave, at the age of 20, the first public proof of his learning and eloquence. In 1678 he received a gold medal from the city for an academic oration, in which he attacked the doctrines of Spinoza. In 1689 he received the degree of Doctor of Philosophy, and maintained an inaugural dissertation, 'De

Distinctione Mentis a Corpore,' in which he attacked Epicurus, Hobbes, and Spinoza. He now commenced, at the age of 22, the study of medicine. Drelincourt was his first and only teacher. From him he received little instruction; and by his own solitary study he learned a science on which he was afterward to exert so important an influence. His first study was anatomy, which he pursued from books, rather than from observation. He attended dissections, indeed, but his writings show a deficiency of practical knowledge. Still he exercised a salutary influence on the study of anatomy, as the use he made of mechanical illustrations induced anatomists to apply themselves to a more accurate study of the forms of the organs. After this preliminary study, Boerhaave read all the works, ancient and modern, on medicine, in the order of time, proceeding from his contemporaries to Hippocrates, with whose superior excellence and correct method he was forcibly struck. He also studied botany and chemistry, and although still preparing himself for the clerical profession, was made in 1693 Doctor of Medicine at Harderwyck. After his return to Leyden, some doubts being raised as to his orthodoxy, he finally determined to follow the profession of medicine. In 1701 the University of Leyden chose him, on the death of Drelincourt, to deliver lectures on the theory of medicine. Boerhaave now began to develop those great and peculiar excellences which make him a pattern to all who undertake the office of instruction. Pupils crowded from all quarters to hear him. His method was eclectic, combining the speculations of opposing schools, and led him to attach too much importance to mechanical and chemical theories of vital actions. In 1709 the University of Leyden appointed him successor to Hotton, in the chair of medicine and botany. The course of instruction to which Boerhaave was now devoted, induced him to publish two works, on which his fame still rests, namely, 'Institutiones Medicæ in Usus Annuæ Exercitationis Domesticos,' and 'Aphorismi de Cognoscendis et Curandis Morbis in Usum Doctrinæ Medicinæ.' In the former, which is a model of comprehensive erudition and clear method, he unfolds his system in its fullest extent; in the latter he undertakes the classification of diseases, and discourses separately on their causes, nature, and treatment. The professorship of botany, which he also filled, contributed no less to his reputation. He rendered essential services to botany by his two catalogues of plants in the garden of Leyden, the number of which he had very much increased. We are indebted to him for the description and delineation of several new plants, and the introduction of some new species. In 1714 he was made rector of the university. At the end of this year he succeeded Bidloo in the chair of practical medicine, which he occupied for more than 10 years. In this office he had the merit of introducing clinical instruction, that is, of lecturing to his students at the bedside of patients in hospital, for the first time in Europe. Busily occupied as he already was, the university conferred on him, at the death of Lemort, the professorship of chemistry, which science he had

taught since 1703. 'His Elements of Chemistry' is one of his finest productions, and notwithstanding the entire revolution which has taken place in this branch of science, is still highly valuable. His experiments are remarkable for their accuracy. So extensive a sphere of action gained for Boerhaave a fame that few learned men have enjoyed. People came from all parts of Europe to ask his advice. His property amounted at his death to 2,000,000 florins. Peter the Great visited him on his travels, and a Chinese mandarin wrote to him with the address, «To Boerhaave, the celebrated physician in Europe.» In 1722 illness obliged him to remit his active pursuits. In this he returned in some measure to the principles of Hippocrates, from which, indeed, he had never departed far in practice. Boerhaave was a man of piety as well as learning. He arose early and devoted an hour every morning to prayer and the study of Scripture. He used to say that the life of a patient, if trifled with or neglected, would one day be required at the hands of the physician.

Boers (Dutch *boer*, a peasant or husbandman), the name commonly applied to the South African colonists of Dutch descent. The Cape Colony was founded by the Dutch in 1650. The Dutch were at this period the leading maritime power of Europe, and their African colonies assumed great importance. When Holland was reduced to the last extremity by the invasion of Louis XIV., serious thoughts were entertained of making the Cape Colony the final refuge of Dutch independence, but this crisis passed away with the advancing power of William. The colony subsequently fell into comparative neglect, and the colonists, left to their own resources, began to develop a character of their own. The troubles in which the parent state was involved by European wars now began also to affect them. The colony was taken possession of by the English in 1795, restored at the peace of Amiens in 1802, taken again in 1806, and finally ceded to England in 1815. The last change was highly distasteful to the colonists. Naturally distrustful of a foreign government, they had formed from their experience of the country and its inhabitants a policy and habits of their own, into which the newcomers could not be expected at once to enter. The Boers, moreover, were strongly conservative, believing that they understood the situation better than anyone else, and they had acquired in their struggles with the natives a reckless daring, which, added to the coolness and caution of the Dutch character, was likely to make them formidable opponents to any government which provoked their hostility.

The policy of the British governors was not always adapted to the circumstances, and the attempts of the British missionaries, encouraged by the colonial government, to convert and civilize the natives, excited the jealousy of the Boers, who thought their own interests compromised by the encouragement given to the converts. The government on various occasions sided with the Kaffirs against the Boers, which, whatever the merits of the particular disputes, was not calculated

to conciliate the latter. The emancipation of their slaves in 1833, and the cession to the Kaffirs in 1835 of a frontier district of neutral territory in the east, filled up the measure of provocation, and the Boers resolved to place themselves by emigration beyond the British rule. A first band set out by land in 1835 for Port Natal, but being ignorant of the passes of the country, went out of their way. Part of them settled in the district near the Zoutpansberg or Salt-pan Mountain, part proceeded to Algoa Bay, but did not succeed in forming a perfect settlement. Another band also proceeding to Natal was attacked by the Matebele Kaffirs, and obliged to fall back on the Modder River. After receiving reinforcements they again advanced and settling in the Orange River district, formed a commonwealth under Peter Retief. This colony was in 1837 invited to join the British settlers who had in the meantime taken possession of Port Natal. Crossing the Quathlamba Mountains for this purpose, Retief and some of his principal followers were treacherously murdered in an interview with the chief of the Zulu Kaffirs. The remainder turned south, and formed the settlement of Pietermaritzburg. Under the leadership of Pretorius they defeated the Zulus, but the colonial government denied their right to form an independent community in this district.

In 1842, a British force was landed, and the Boers were compelled to retire from the coast and acknowledge the British sovereignty. Many of them recrossed the mountains, and settled in the Vaal district. Further disagreements with the colonial government, which had now possession of Natal, led to another emigration to the north of the Klipp River. Here they struggled successfully with the Kaffirs till 1845, when the colonial government proclaimed the Buffalo River the north boundary of Natal. The Boers openly resisted, but finding their strength unequal to the conflict, again emigrated to the Vaal country. In 1848 the colonial government likewise annexed by proclamation the Orange River settlement. The Boers, headed by Pretorius, took up arms, but being defeated retired beyond the Vaal, and with the previous settlers formed the Transvaal republic. Those who remained continued their resistance to the British authority until, in 1851, on the outbreak of the Kaffir war, the British relinquished the Orange River territory, and recognized the independence of the Orange Free State. In 1877 the Transvaal was annexed by Britain, according to the wish of many of the people, but war broke out in 1880, British forces suffered more than one defeat, and in 1881 the country was accorded a modified independence. Henceforth it was a common feeling among the Boers that they and not the British must be predominant in South Africa, and in October 1899, after a defiant ultimatum, the united forces of the Transvaal and Orange Free State invaded Natal. After nearly three years of warfare the two republics were annexed by proclamation. See JAMESON; KRUGER; MAJUBA HILL; NATAL; ORANGE RIVER COLONY; SOUTH AFRICAN WAR; TRANSVAAL, etc.

Boëthus, Greek sculptor: b. Chalcedon in the 2d century B.C. He is celebrated for his statues of children. 'The Boy With the Swan' was his most famous work. A girl playing with dice and a boy extracting a thorn were subjects of other masterpieces by him.

Boethius, bō-ē'thī-ūs, **Anicius Manlius Severinus**, Roman statesman and philosopher: b. about 470 A.D., in Rome or Milan; d. 524 or 526. He was educated in Rome, in a manner well calculated to develop his extraordinary abilities. Theodoric, king of the Ostrogoths, then master of Italy, loaded him with marks of favor and esteem, and raised him to the first offices in the empire. He exerted the best influence on the administration of this monarch, so that the dominion of the Goths promoted the welfare and happiness of the people who were subject to them. He was long the oracle of his sovereign and the idol of the people. The highest honors were thought inadequate to reward his virtues and services. But Theodoric, as he grew old, became irritable, jealous, and distrustful of those about him. The Goths now indulged in all sorts of oppression and extortion, while Boethius exerted himself in vain to restrain them. He had already made many enemies by his strict integrity and vigilant justice. These at last succeeded in prejudicing the king against him, and rendering him suspicious of Boethius. His opposition to their unjust measures was construed into a rebellious temper, and he was accused of a treasonable correspondence with the court of Constantinople. He was arrested, imprisoned, and executed. He made many laborious translations of the Greek philosophers, particularly of Aristotle. These translations, and especially his commentaries on Aristotle, caused him to be regarded up till the 14th century as the highest authority in philosophy. His treatise, 'De Musica,' also supplied for many centuries the place of Greek originals. His fame now chiefly rests on his 'Consolations of Philosophy,' written in prison, a work of elevated thought and diction. It is written partly in prose and partly in verse. The oldest edition of this work was published at Nuremberg in 1473. It was translated by King Alfred and Chaucer, and was highly prized during the Middle Ages. Boethius also translated into Latin Euclid and other Greek mathematical works, and wrote short treatises on algebra and geometry, which were used as school text-books during the Middle Ages. The appearance in these works of characters similar to Hindu numerals has raised the question as to whether he was familiar with the works of the Hindu mathematicians.

Boettcher, bé'tik-ér, **Jean Frederick** (his name is also spelled **Boettiger**), German alchemist: b. Schleiz, 1681; d. 1719. A man of dissolute manners and dishonorable conduct, he is celebrated for his extraordinary adventures, and his fortunate discovery of the famous Dresden porcelain. Apprenticed to an apothecary in Berlin, he spent his time in the pursuit of alchemy, and fraudulently pretended to have made gold. This discovery, as it was believed to be, exposed him to the danger of a prosecution for sorcery, to avoid

which he fled. Such was the credulity of the time, that the Prussian government was anxious for his return, and the Elector of Saxony, then king of Poland, supplied him with the means of prosecuting his inquiries, and was entertained by his promises for three years. By the advice of Count Tschirnhausen, the elector was induced to turn the real chemical knowledge and abilities of Boettcher to account in developing the resources of the country. This sensible advice was rewarded with the discovery of a red clay at Meissen, from which a beautiful porcelain could be made. Boettcher was intrusted with the direction of the manufacture, but was so little trustworthy that he had almost to be detained a prisoner to prevent his divulging the secrets of the process. He had actually entered into a negotiation with some Prussians to do so, and his death alone saved him from the punishment of his treachery.

Boeuf Bayou, béf bi'oo, a stream in Louisiana, formed in times of high water by overflow from the Mississippi, when it affords nearly 100 miles of steamboat navigation. It is an affluent of the Washita River.

Boffin's Bower, in Dickens' 'Our Mutual Friend,' home of the Boffins. The name was given by Mrs. Boffin, who did not approve of its former name, 'Harmon's Jail.'

Bog, an Irish word, literally meaning soft, applied in Great Britain to extensive districts of marshy land, such as we commonly call in this country swamps. They consist, in Europe, so universally of peat, that this substance is there generally regarded essential to a bog. As we use the word, it is in the sense of a quagmire; any soft and wet spot into which a man would sink in attempting to cross it, being called a bog. The true bog is most commonly found in northern latitudes, and in districts where great humidity prevails. Their situation is not necessarily low, nor their surface level. Some of the great Irish bogs present even a hilly appearance, which, perhaps, is the result of the spread of the mosses in their lateral growth from lower situations over intervening higher grounds. Bogs were formerly supposed to owe their origin to the destruction of forests, and in particular to the obstruction of drainage from fallen trees, causing lodgments of water, and favoring the growth of marsh plants. This theory can only be partially true. Fallen trees and also standing roots are frequently found in a state of great preservation in bogs, but the agency of felled trees in the production of bog has been completely disproved, six or seven feet of bog being found under the roots of remaining trees, showing the previous formation of the bog. The process of bog formation is thus described: When a shallow pool induces the formation of aquatic plants, they gradually creep in from the borders to the deeper centre. Mud accumulates round their roots and stalks, and a spongy semi-fluid mass is formed, well suited for the growth of moss, particularly Sphagnum, which now begins to luxuriate, continually absorbing water, and shooting out new plants above as the old decay beneath; these are consequently rotted, and compressed into a solid substance, grad-

BOG-BUMPER—BOG IRON ORE

ually replacing the water by a mass of vegetable matter. A layer of clay, frequently found over gravel, assists the formation of bog by its power of retaining moisture. When the subsoil is very retentive, and the quantity of water has become excessive, the superincumbent peat has sometimes burst forth and floated over adjacent lands. This happened near Killarney in 1896, and caused the loss of nine lives. Quagmires are caused by the decay of the roots of plants underneath. The plants thus detached from the bottom, rise to the surface, and are kept floating in moisture. Elastic under light pressure, they yield suddenly to the weight of heavy bodies, their only strength consisting in the interlacing of their decayed fibres.

Throughout the country, along the seaboard to the gulf of Mexico, bog-like swamps are of frequent occurrence. Their outer portions are sometimes wooded swamps, while within they present moss-covered heaths, stretching, like the western prairies, farther than the eye can see, and dotted occasionally with clumps or little islands of trees. In New England, the northwestern States, and Canada, the bogs furnish genuine peat, and some of those bordering on the Great Lakes are of great extent. On Long Island, near New York, the bogs present a marked feature along the sandy coast.

British bogs are generally divided into two classes—red bogs, or peat mosses, and black bogs, or mountain mosses. The former class are found in extensive plains frequently running through several counties. The Chatmoss in Lancashire, and the Allen in Ireland, are examples of this class. Their texture is light and full of filaments, and is formed by the decay of mosses and plants of different kinds. The color becomes darker, and the density increases with the depth of the bog. The lower parts, being more entirely decayed, approach nearer to the nature of humus than the upper portion. They are also more carbonaceous, and consequently more valuable for fuel. The depth of the red mosses varies from 12 to 42 feet. The chief reasons of the unproductiveness of this class of bogs are the acids in which the plants composing them abound, and which are noxious to the higher orders of vegetation, and the circumstance that the decomposition of the plants takes place under water, where they are excluded from the action of the oxygen and nitrogen of the air, and consequently deprived of the power of evolving carbon and ammonia. Black bog is formed by a more rapid decomposition of plants. It is heavier and more homogeneous in quality. It is common in Ireland and Scotland, but is usually found in limited and detached portions. In Ireland these frequently rest on calcareous subsoil, which is of great value for reclaiming them. The black bog is so frequently found at high elevations that its reclamation presents considerable difficulties, but when it is found in plains or gentle inclinations it may be reclaimed with comparative ease. The soil in mountainous districts, being shallow, is not suited for cereals, but if the mistake of sowing these is avoided, they may be made into good pasture land. The reclamation of the extensive red bogs found

in various parts of the country, especially in Ireland, which has more than 1,500,000 acres of them, has long occupied attention; but the progress of improvement has been hindered by questions of land tenure, disposal of capital, and other difficulties external to the practicability of the desired reformation. Many extensive experiments have, however, been made with encouraging success, and while it is perhaps doubtful how far reclamation will repay the immediate improver, it appears from a national point of view to offer undoubted advantages.

In the reclamation of bog land three things require to be accomplished. The land must be thoroughly drained, and a permanent system of drainage established. The loose and spongy soil must be mixed with a sufficient quantity of mineral matter to give the requisite firmness to its texture, and to fertilize its superabundant humus. Proper manures must be provided to facilitate the extraction of nutriment from the new soil, and a rotation of crops suitable for bringing it into permanent condition adopted. The difficulties of reclamation lie chiefly in the first and second of these requirements.

The materials best adapted for reclaiming peat are calcareous earths, limestone gravel, shell marl, and shell sand. Caustic lime, although it neutralizes the acids of the soil, causes too rapid a decomposition of the vegetable matter. These materials are frequently found in the subsoil or in the neighborhood, but the labor of raising them from the subsoil is often greater than that of bringing them from other, especially from adjacent quarters.

Paring and burning, or removing a portion of the peat for fuel, when the subsoil is good, are other modes of facilitating improvement. The limited demand for peat fuel prevents the latter system being carried on extensively. Thoroughly reclaimed bogs are not liable to revert to their former condition. For further particulars see CHATMOSS.

Bog-bumper, Bog-jumper, or Bog-pumper.
See BITTERN.

Bog-butter, a fatty spermaceti-like substance found in masses in peat-bogs, composed of carbon, oxygen, and hydrogen, and for years supposed to have been formed by the decomposition of peat. In 1885 Macadam proved that it is of animal origin, being, in fact, a variety of adipocere, and is formed by the decomposition of animal substances, out of contact with the air.

Bog Iron Ore, a variety of limonite formed in bogs and swamps by the reducing action of decaying vegetable matter on soluble iron salts. It is generally loose textured, and brown or brownish yellow in color. The ore usually contains such a high percentage of impurities, especially sulphur and phosphorus, that it cannot be utilized for iron manufacture; it finds limited application, however, in the purification of illuminating gas. Deposits of bog iron ore are widespread. In the United States extensive beds occur along the Atlantic coast from New York southward, and the first blast furnaces erected in this country were supplied from them. Similar deposits occur in Great Britain and most of the countries of Europe.

BOG-MOSS — BOGDANOWITCH

Bog-moss. See SPHAGNUM.

Bog-oak, trunks and large branches of oak found imbedded in bogs and preserved by the antiseptic properties of peat, so that the grain of the wood is little affected by the many ages during which it has lain interred. It is of a shining black or ebony color, derived from its impregnation with iron, and is frequently converted into ornamental pieces of furniture and ornaments, as brooches, earrings, etc.

Bog-trotter, a name contemptuously applied to the Irish peasantry on account of their ability to make their way across the bogs where no one else can find footing, which frequently gives them a means of escape from officers of police, and other pursuers.

Bogaers, Adriaan, ă'drî-ăn bō'gärs, Dutch poet: b. The Hague, 1795; d. 1870. He holds an eminent place among the many disciples of Tollens, and surpasses his master in correctness of taste. He long withheld his compositions from publication, and not till 1832 did he become known to his countrymen; he then published his first lyric poem, 'Volharding,'—an appeal to his countrymen to stand fast in the struggle with Belgium,—together with other patriotic pieces. His first poem of any considerable compass, the epic 'Jochebed,' and his masterpiece, 'The Voyage of Heemskerk to Gibraltar,' were first formally published in 1860-1, though they had had for many years a private circulation among friends. He afterward published three volumes, 'Ballads and Romances,' 'Flowers of Poesy from Abroad,' and 'Poem.'

Bo'gan, or **New Year River**, a river of East Australia, rises in the Harvey range, flows northwest, and empties into the Darling River; length over 300 miles.

Bogar'dus Everardus, second pastor of the church in New Amsterdam (New York): d. 27 Dec. 1647. He is noted as the husband of Anneke Jans, whose ownership of 60 acres of land in the business portion of New York has given her descendants occasion for almost continuous law suits, during 200 years, to recover possession of the property which is held by the corporation of Trinity Church.

Bogardus, James, American inventor: b. Catskill, N. Y., 14 March 1800; d. 13 April 1874. He was apprenticed to a watchmaker, and early showed the bent of his mind by improvements in the construction of eight-day clocks, and by the invention of a delicate engraving machine. The dry gas meter is his invention, as is also the transfer machine to produce bank-note plates from separate dies; and in 1839 his plan for manufacturing postage stamps was accepted by the British government. Later he introduced improvements in the manufacture of india-rubber goods, tools, and machinery; and invented a pyrometer, a deep-sea sounding machine, and a dynamometer. In 1847 he built the first iron building ever erected in the city of New York.

Bogatzky, Karl Heinrich von, kār'l hîn'-rîh fôn bō-gäts'ke, Protestant theological writer: b. Tankowa, Silesia, 1690; d. Halle, 1774. His principal works are: 'Tägliche Schatz-Kästlein der Kinder Gottes,' published in 1718; 'Geistliche Gedichte,' in 1749. The former has been translated into English under the title of Bogatzky's 'Golden Treasury.'

Bogdo-ola, bōg-dō-oo'la, or **Holy Mount**, a hill in Russia, in the government of Astrakhan, near the Aktuba, and 14 miles east of Tchernoiarsk. It forms an isolated cone, nearly 500 feet high, in the middle of a vast steppe. It appears to rest on limestone, overlain by sandstone, which on the northeast side rises perpendicularly like a wall, and is cut into deep clefts, frequented by innumerable birds. The sandstone is succeeded by alternate red and white layers of clay and sand, which have a very singular appearance. The summit is chiefly composed of masses of rock-salt. At the foot of the hill there is a salt lake called Bogdoin Dabassu.

Bogdan, Negrul, governor of Moldavia, son of Stephen the Great, who, at his death in 1522, counseled his son to anticipate by voluntary submission to the Turks, an inevitable conquest. Bogdan did not at first follow this counsel; but having lost within a year the battle of Mohács, and Hungary having been invaded by a large Turkish force, he sent to Solymán offers of submission. He was received with favor by the Sultan, and in return for an annual tribute of 4,000 crowns of gold, beside numerous horses and falcons, Moldavia was allowed to preserve its own religion, an independent administration, and the right to choose its own princes. Bogdan did not long survive this treaty, and his successor refusing to pay the tribute, drew again the arms of the Turks upon the Moldavian principality.

Bogdanovich, Modést Ivanovich, mō-däst ē-văn'ō-vîch bōg-dā-nō'vech, Russian military historian and commander: b. 1805; d. 6 Aug. 1882. He was a very able soldier, and even abler with the pen; his 'Bonaparte's Campaign in Italy, 1796,' and 'History of the Art of War,' and particularly his 'History of the Campaign of 1812,' having attracted wide notice.

Bogdanowitch, Hippolyt Federowitch, hîp'-pō-lî't fêd-ēr-ō'vech bōg-dā-nō'vech, Russian Anacreon: b. Perewolotschna, in White Russia, 1743; d. 1803. His father was a physician. He was designed for an engineer, but the sight of a splendid play, and the reading of Lomonosow's poems, turned his inclination to poetry. He wished to become an actor, but the manager of the theatre, Cheraskow, dissuaded him from his purpose. By his advice he applied himself to the study of the fine arts, and to learning foreign languages. He gained patrons and friends, and in 1761 was made inspector in the University of Moscow, and afterward translator in the department of foreign affairs. In 1762 he traveled with Count Beloselsky as secretary of legation to Dresden, where he devoted his whole attention to the study of the fine arts and of poetry till 1768. The beautiful pictures in the gallery of that place inspired him to write his 'Psyche,' which appeared in 1775, and fixed his fame on a lasting foundation. After this he devoted himself to music and poetry, in solitary study at St. Petersburg, till Catharine called him from his retirement. He then wrote on different occasions several dramatic and historical pieces. In 1788 he was made president of the imperial archives. In 1795 he took leave of the court, and lived as a private man in Little Russia. Alexander recalled him to St. Petersburg, where he lived till his death. He was as

BOGERMAN — BOGOS

remarkable for modesty as for genius, and a man of childlike goodness and vivacity.

Bogerman, Jan, *yān bō'gér-mān*, Dutch theologian: b. Oplewert, 1576; d. 1637. He was professor of divinity at the University of Franeker; participated in the Armenian controversy, and was president of the Synod of Dort, 1618. With four others he translated the Bible into Dutch; this translation is at present the common Dutch version. He also wrote 'Annotationes contra H. Grotium,' and translated Beza's 'De la punition des hérétiques.'

Bogert, George H., artist: b. New York, 1864. His first studies were made under Thomas Eakins; later he studied in Paris under Raphael Collins, Aimé Morot, and Puvis de Chavannes. He won the Webb prize, 1898; the first Hallgarten prize of the National Academy of Design, 1899; and was awarded a bronze medal at the Paris Exposition, 1900. His studio is in New York.

Boggs, Charles Stuart, American naval officer: b. New Brunswick, N. J., 28 Jan. 1811; d. 22 April 1888. He entered the navy in 1826; served on the Princeton in the Mexican war; was assigned to the gunboat Varuna in Farragut's Gulf squadron in 1861. In the attack on forts St. Philip and Jackson, in April 1862, he destroyed six Confederate gunboats and two rams, and in the last moments of the fight his own vessel was sunk. In 1869-70 he served with the European squadron; in the latter year was promoted to rear-admiral; and in 1873 was retired.

Boggs, Frank M., artist: b. Springfield, Ohio, 6 Dec. 1855. He received his art education at the École des Beaux Arts and under Gérôme in Paris. In 1882 the French government bought his picture, 'Place de la Bastille,' for the Luxembourg Museum, and in 1883 his 'Isigny' for the Niort Museum. His pictures are to be found in many of the best French private collections, and in the museums at Havre, Nantes, and Dieppe. In the first prize fund exposition of the American Art Gallery (N. Y.), he received a prize of \$2,500 for his picture 'A Rough Day, Honfleur,' now in the Boston Museum.

Bøgh, Erik, *ēr'ik bæg*, Danish poet and dramatist: b. Copenhagen, 17 Jan. 1822. He is best known for his witty stanzas and epigrams in periodicals, for 'This and That,' a collection of humorous essays, and for a hundred or so of plays and farces. A novel, 'Jonas Tvär-mose's Vexations,' has merit.

Boghaz-Keui, *bō'gāz-kyé'ē*, Asia Minor, a village in the vilayet of Angora, commonly identified with the ancient Pterium, though this is now doubtful. The village is insignificant, but important Hittite ruins, including a palace and a number of unusual sculptures, have been discovered near by.

Boghead Coal, a brown cannel-coal, found at Boghead, near Bathgate, Scotland, and very valuable for gas and oil making.

Bognor, *bō'gnér*, an English watering-place on the coast of Sussex, nine and a half miles southeast of Chichester by railway. There is a pier 1,000 feet long, constructed chiefly of iron, and also an esplanade. The

place was brought into vogue toward the end of last century by Sir R. Hotham, who spent \$300,000 on it.

Bo'go, Philippines, a town with about 17,000 population, situated on the east coast near the northern end of the island of Cebu. It has a good harbor.

Bog'omiles, a religious sect, said to have been pretty widely spread in Thrace and Bulgaria as early as the 10th century. They were persecuted by the Byzantine emperor, Alexander Comnenos, and their leader, named Basil, was burned alive at Constantinople in 1118. The name of the sect is said to be composed of two Slavonic words, meaning friends of God. The Bogomiles believed that God had two sons, Satanael and Jesus, or Logos. The former rebelled, and created the material world, and also man. God gave a soul to man, but he was left under the control of Satanael until the coming of the Logos. The law was given to Moses by Satanael, and is not recognized by the Bogomiles, who accept of the Old Testament only the Psalms and the Prophets. The Logos, or Christ, came down from heaven to deliver man from the power of Satanael. This sect, which held many extravagancies of doctrine, continued to exist for several centuries. They practised severe asceticism, rejected the sacraments, or put new interpretations on them, and made frequent prayers both by day and night.

Bogos, *bō'gōz*, a people of Abyssinia, occupying a district to the south of the Anseba, to the east of Habab and Mensa, and to the north and west of Barca. The land is intersected by the broad and beautiful valley of the Anseba, and comprises on the west the elevated and hilly region as far as the sources of the Barca, and on the east the slopes of the plateau of Mensa. The climate and vegetation are similar to those of Abyssinia. The rainy season lasts from March to September, when the Anseba overflows its banks and fertilizes the valley through which it flows. There is a great variety both in the flora and the fauna of the country. Large baobab trees, sycamores, and tamarinds overshadow the banks of the Anseba, which are rendered almost impassable by the number of Euphorbiae and creeping plants. At the same time there are to be found rhinoceroses, elephants, wild boars, buffalos, antelopes, lions, leopards, wildcats, jackals, wolves, etc., in great numbers. The population is only about 10,000, which is engaged in agriculture and the raising of cattle, and carry on a trade with the neighboring places in corn, butter, ivory, skins, buffalo-horns, and ostrich-feathers. Their language, which is akin to the Agow, is called by themselves Bilin. Their countenance is Greek in its contour, their body light, powerful, and well formed; the color of their skin dark olive-brown; their lips are thin, the cheekbones not prominent, and they have generally bushy whiskers. The patriarchal institutions of the Bogos are peculiar. The members of each union of families are pledged to apprehend any one of their number who is charged with the commission of a crime. The laws relating to dowries, inheritance, and murder are regularly codified. The religion is the Christian, but Mohammedanism, which is increasing, has a considerable number of adherents.

Bogoslov, bō-gō-slōf', a small volcanic island of the Aleutian archipelago, lying north-west of Unalaska. It was formed in 1795-6 by a series of volcanic upheavals; on the site previously there had been low rocks and reefs.

Bogotá, bō-gō-tā', or **Santa Fé de Bogotá**', the capital of the Republic of Colombia, has a population of about 120,000; and despite the fact that it is but 4° 41' north of the equator, the elevation of the plateau on which it stands is so great that the breeze is cool and invigorating. A fertile plain or table-land of exquisite beauty extends for a distance of about 30 miles on three sides, while directly above rise two mountains of moderate height, and surrounding the whole scene are snow-capped peaks of the Andes—among them the extinct volcano of Tolima. Water is supplied by two mountain streams flowing through the town itself. Unfortunately the overcrowding of buildings occupied by the poorer classes, and the absence of a good system of drainage, offset the conditions otherwise favorable to health. Bogotá is lighted by gas and electricity; its streets are well laid out; and the houses, though low, are substantially built. There is a valuable library of over 50,000 volumes; and the university, founded in 1867, is considered the best in the Andean region north of Peru. On 12 Sept. 1902, the government decreed the establishment of a museum and academy, to increase the popularity and efficiency of the National School of the Fine Arts. Founded in 1538 by Gonzalo Ximenes de Quesada, a native of Santa Fé, a small town near the city of Granada, and in the Spanish province of that name, Bogotá became the capital of New Granada, as the country was first called by the Spaniards. For history, industries, etc., see COLOMBIA.

MARRION WILCOX.

Bogue, David, the originator of the London Missionary Society: b. Hallydown, Berwickshire, 18 Feb. 1750; d. Brighton, 25 Oct. 1825. In 1771 he removed to London, and became minister of an Independent chapel at Gosport. In 1780 he became tutor to an establishment for directing the studies of young men destined for the ministry in the Independent communion. He now began the formation of a missionary scheme, which afterward resulted in the London Missionary Society. The influence which the establishment of this institution had on the public mind was great, and the springing up of the British and Foreign Bible Society and the Religious Tract Society, at short intervals, proves how much good was effected by the impetus it imparted. In the establishment of both of these he took an active part, contributing to the latter body the first of a series of publications which have been of great use. In 1815 Mr. Bogue received the degree of Doctor of Divinity from Yale College. The only works of any extent for which we are indebted to the pen of Dr. Bogue are: 'An Essay on the Divine Authority of the New Testament,' 'Discourses on the Millennium,' and a 'History of Dissenters,' which he undertook in conjunction with his pupil and friend, Dr. Bennet. The first of these has been translated into the French, Italian, German, and Spanish languages, and has been widely circulated on the continent of Europe.

Boguslawski, bō-goo-slāv'ske, **Palm Henry Louis von**, astronomer: b. Magdeburg, 1789;

d. Breslau, 1851. He was educated in the Cathedral School of Magdeburg, and early displayed a particular turn for astronomical pursuits. The comet of 1807 gave him the first opportunity of making special observations. In 1809, having been appointed bombardier in the Silesian Artillery Brigade, he passed his examination in Berlin with so much distinction that he was named lieutenant, and remained in attendance on the general military school in Berlin, where he took part in Bode's observations on the great comet. The campaigns of the war of independence procured him, through his connection with Bode, access to the best observatories and the acquaintance of the most distinguished astronomers. His military career terminated at the battle of Waterloo, after which, in consequence of a supervening weakness in his eyesight, he became unfit for further active service. He afterward turned his attention to agriculture, and in course of time his eyesight was completely restored. His love for astronomy had always remained, though he had wanted proper opportunity for cultivating it; but in 1829, on resuming his residence in Breslau, his studies again took that direction, and he became first conservator and then director of the observatory. By his discovery, in 1834, of the comet named after him, and his observations on Saturn's rings, and the comets of Biela, Encke, Halley, etc., he rendered important services. As no chair was connected with his position at the observatory, he at first merely delivered popular lectures. A regular professorship, however, was given him in 1836. As a writer he made himself known by the publication of the 'Uranus.'

Boha-eddin, bō-ha-ēd'din, or **Bohaddin**, Arabian scholar and historian: b. Mosul, 1145; d. 1235. Having attained proficiency in Moslem law, he became, at the age of 27, a lecturer at Bagdad. In 1186 he made the pilgrimage to Mecca, and returned through the holy land, visiting Jerusalem, Hebron, and other sacred cities. While in Damascus, he was summoned to the Moslem camp by Saladin, who was desirous of availing himself of the services and influence of so able a scholar, and a man of such reputed Moslem piety and zeal. He accordingly brought his learning and talent to the work of glorifying the wars of that ambitious monarch, in a treatise on the 'Laws and Discipline of Sacred War.' Saladin appointed him *cadi* of Jerusalem and of the army, and a strong attachment from the commencement existed between them, which the scholar knew well how to turn to good account. On the death of Saladin he transferred his attachment to the son, Malek-al-Dhaher, whom he was instrumental in establishing in the succession of the throne. In return, the new prince of Aleppo appointed Boha-eddin to the office of *cadi* of the city, which brought him constantly to reside in the royal court. Aleppo now became the resort for men of science and learning. At this period of his life Boha-eddin founded a college, and he continued to give lectures until he was 90 years old. His great work was, however, the 'Life of Saladin.' It is a work pronounced, on the whole, free from the extravagance which so generally renders Oriental productions distasteful to the more practical scholars of the West. It is written from the standpoint of a zealous Moslem, rather than from that of the practised soldier or the politic statesman.

BOHEA — BOHEMIA

Bohea, an inferior kind of black tea. The name is sometimes applied to black teas in general, comprehending Souchong, Pekoe, Congou, and common Bohea.

Bohemia, Böhmen (anciently **BOHEIM**), a province with the title of kingdom in the Austro-Hungarian monarchy, bounded on the southwest by Bavaria, on the northwest by the kingdom of Saxony, on the northeast by the Prussian province of Silesia, and on the southeast by Moravia and the archduchy of Austria. It contains 20,051 square miles, and has about 6,500,000 inhabitants, of whom above three fifths are Czechs, nearly 90,000 Jews, and more than 2,000,000 are Germans. Bohemia is surrounded on all sides by mountains, possesses large forests and many small lakes or ponds. Its plains are remarkably fertile. The largest rivers are the Elbe and the Moldau. All sorts of grain, flax, hops (the best in Europe), and fruits are exported. Wine is not abundant, but in the neighborhood of Mělník is of pretty good quality. The raising of sheep, horses, swine, and poultry is carried on to a considerable extent. The mines yield silver, copper, lead, tin, garnets, and other precious stones, iron, cobalt, arsenic, uranium, and tungsten, antimony, vitriol, alum, calamine, sulphur, plumbago, and coal in abundance. There are also numerous mineral springs, but little salt.

The industry of Bohemia, favored by its central situation, has long rendered it one of the most important governments of the Austrian empire. Spinning and weaving are extensively carried on in the northern and southeastern districts; manufactures of lace, ribbons, metal, and wood work, chemical products, and other branches of skilled industry are also largely developed. Pottery, porcelain, glassware, cutting of precious stones, give employment to many hands. The glassware of Bohemia alone, which is known all over Europe, employs 50,000 workers. Large quantities of beer (Pilsener) of the kind known as lager are exported. Prague, the capital, is the centre of the manufactures and of the commerce of the country. The largest towns are Prague, Pilsen, Reichenberg, Budweis, Teplitz, Aussig, and Eger. For internal intercourse there are excellent highways, extending to 10,000 miles, and several important lines of railway leading both southeast to Vienna and northwest toward Dresden. The Bohemians of all ranks are distinguished for public spirit. Among the public establishments for education are a German and a Czech university at Prague, two technical high schools, four theological academies, many gymnasiums, and over 5,000 schools. The prevailing religion is the Roman Catholic; other sects, however, are tolerated. The language of the country is Bohemian, a dialect of the Slavonic; in some districts, and in most of the cities, German is spoken. See **BOHEMIAN LANGUAGE AND LITERATURE**.

History.—Bohemia received its name from a tribe of Gallic origin, the Boii, who were expelled by the Marcomans at the commencement of the Christian era; the latter were in turn obliged to give place to the Germans, and these to the Czechs, a Slavonic people who had established themselves in Bohemia by the middle of the 5th century. The country was at first divided into numerous principalities, which were

temporarily united into a monarchy in 627 under Samo, but the work of this prince did not survive himself. Charlemagne attempted the conquest of Bohemia without permanent result, although he succeeded in rendering it tributary; and the Emperor Louis had his army nearly destroyed by the Bohemians in 849. Christianity was introduced into Bohemia in the reign of Borzwoj I. (894-902), a descendant of Přemysl, whose family held sway in Bohemia for about six centuries (722-1306). In 1092 Bohemia was finally recognized as a kingdom under Wratislav II. Up to 1230 the monarchy was elective and then became hereditary; the right of election, however, was suspended, not abrogated. The monarchs received investiture from the German emperor, held one of the great offices in the imperial court, and were recognized as among the seven electors of the empire. Separated from Germany, however, by a rampart of mountains, by origin, language, and national customs, the Bohemians kept aloof from the general politics of the empire, and their kings frequently received dispensations from attending the diet. The peasantry were in a state of villenage, but there was a numerous and powerful nobility, the diet assembled frequently, and the nobles came armed to defend their rights. The royal authority was limited by the coronation oath. Bohemia was frequently at war with Poland, the emperor, or some of the surrounding states; it was successively united and disunited with Hungary, Silesia, Moravia, etc., according to the course of wars and alliances. Ottokar II. (1253-78) had extended his conquests almost from the Adriatic to the Baltic, when he lost them and his life in contest with Rudolph, the founder of the too successful house of Hapsburg. His grandson Wenceslas III. was assassinated at Olmütz, and with him closed the dynasty of Přemysl. The house of Luxemburg succeeded in 1310, and governed Bohemia till 1437. Under Charles IV. (1346-78), who also held the sceptre of the German empire, Bohemia prospered, and advanced in civilization and science. Toward the close of this second dynasty civil wars were excited by the promulgation of the doctrines of Huss and the persecution of his followers. These wars were protracted by the genius of John Ziska, the leader of the Hussites, a man who, although latterly quite blind, has for military genius been compared to Hannibal. Ziska was rarely defeated, and his success inspired the utmost enthusiasm in his followers. He has been called the inventor of the modern art of fortification, and by his skill in this art he made Mount Tabor an impregnable fortress. After the death of Ziska the moderate party of the Hussites, who were called Calixtines, from their insisting on the retention of the sacramental cup for the laity, united with the Roman Catholics, and Sigismund was acknowledged king in 1433. The conditions of this compact being ill observed, George Podiebrad, a nobleman of the reformed party, was by them elected king in 1458. On his death in 1471 they chose Wladislas, son of Cassimir, king of Poland, who also obtained the crown of Hungary. His son Louis lost both crowns with his life in the battle of Mohács against the Turks, and Ferdinand of Austria became, in 1527, sovereign of both kingdoms. Bohemia then lost its separate existence, being declared hereditary in the house of Austria. Its subse-

BOHEMIA MANOR — BOHEMIAN LANGUAGE AND LITERATURE

quent history pertains to that of the Austrian empire. It was desolated by the Thirty Years' war, and it suffered severely from religious persecutions, by which, indeed, the reformed faith was almost entirely suppressed in it. The Emperor Joseph II. gave some protection to the Protestants. In 1848, when Europe was convulsed with revolutionary movements, a momentary attempt was made to assert the ancient independence of Bohemia against the Austrian dominion; a conflict took place between the army and the people, Prague was bombarded, and the insurrection suppressed. Since then the most prominent feature in the history of Bohemia has been a constant struggle for ascendancy between the Slavonic Czechs and the Germans. See AUSTRIA.

Bohemia Manor, the name given to a tract of some 5,000 acres bordering on the Elk River, Maryland, granted by Lord Baltimore in 1666 to Augustine Herman. The latter was a Bohemian surveyor who pledged himself to make a map of Maryland in return for the land. Obtaining denization papers, he and his family were naturalized under the first legislative act of that kind in the province.

Bohemian Brethren, a Christian sect which arose in Bohemia about the middle of the 15th century from the remains of the Hussites. Dissatisfied with the advances toward the Catholic Church by which the Calixtines had made themselves the ruling party in Bohemia, they refused to receive the compacts, as they were called, that is, the articles of agreement between that party and the council at Basel (30 Nov. 1433), and began about 1457, under the direction of a clergyman, Michael Bradatz, to form themselves into separate parishes, to hold meetings of their own, and to distinguish themselves from the rest of the Hussites by the name of Brothers, or Brothers' Union. Amidst the hardships and oppressions which they suffered from the Calixtines and the Roman Catholics without making any resistance, their numbers increased so much, through their constancy in their belief and the purity of their morals, that in 1500 their parishes amounted to 200, most of which had chapels belonging to them. The peculiarities of their religious belief are seen in their confessions of faith, especially their opinions with regard to the Lord's Supper. They rejected the idea of transubstantiation, and admitted only a mystical spiritual presence of Christ in the eucharist. In other points they took the Scriptures as the ground of their doctrines throughout, and for this, but more especially for the constitution and discipline of their churches, received the approbation of the reformers of the 16th century. This constitution of theirs was framed according to what they believed to have been that of the oldest apostolic churches. They aimed at restoring the primitive purity of Christianity by the exclusion of the vicious from their communion, and by making three degrees of excommunication, as well as by the careful separation of the sexes, and the distribution of the members of their society into three classes — the beginners, the proficient, and the perfect. Their strict system of superintendence, extending even to the minute details of domestic life, did much toward promoting this object. To carry on their system they had a multitude of officers of different degrees; or-

daining bishops, seniors, and conseniors, presbyters or preachers, deacons, ædiles, and acolytes, among whom the management of the ecclesiastical, moral, and civil affairs of the community was distributed. Their first bishop received his ordination from a Waldensian bishop, though their churches held no communion with the Waldenses in Bohemia. They were destined, however, to experience a like fate with that oppressed sect. When, in conformity with their principle of not performing military service, they refused to take up arms in the Smalkaldic war, Ferdinand took their churches from them, and in 1548, 1,000 of their society retired into Poland and Prussia, where they first settled in Marienwerder. The agreement which they concluded at Sendomir (14 April 1570) with the Polish Lutherans and Calvinistic churches, and still more the Dissenters' Peace Act of the Polish Convention (1572), obtained toleration for them in Poland, where they united more closely with the Calvinists under the persecutions of the Swedish Sigismund, and have continued in this connection to the present day.

Their brethren who remained in Moravia and Bohemia recovered a certain degree of liberty under Maximilian II., and had their chief residence at Fulneck in Moravia, whence they have been known as the Moravian Brethren. The issue of the Thirty Years' war, which terminated so unfortunately for the Protestants, occasioned the entire destruction of their churches, and their last bishop, Comenius, who had rendered important services in the education of youth, was compelled to flee. From this time they made frequent migrations, the most important of which took place in 1722, and occasioned the establishment of the new churches of the Brethren by Count Zinzendorf (q.v.). Although the old Bohemian Brethren must be regarded as now extinct, this society will ever deserve remembrance, as a quiet guardian of Christian truth and piety, in times just emerging from the barbarity of the Middle Ages; as a promoter of pure morals, such as the reformers of the 16th century were unable to establish in their churches; and as the parent of the esteemed and widely extended association of the United Brethren, whose constitution has been modeled after theirs. See UNITED BRETHREN.

Bohemian Forest (BÖHMERWALD), a mountain range or ridge of central Europe, extending from the Fichtelgebirge southward toward the confluence of the Ilz and the Danube, and separating Bavaria from Bohemia. The Bohemian forest in ancient times formed a part of the Silva Hercynia, the highest peaks being the Arber (4,840 feet high) and Rachel. The great abundance of wood has occasioned the establishment of many glass houses, forges, etc., in this region. The inhabitants have acquired in their seclusion from the world, many characteristic virtues and vices.

Bohemian Language and Literature. The language of Bohemia, otherwise called Czech, is one of the Slavonic group of the Aryan or Indo-European family of tongues, and accordingly allied to Polish, Russian, Servian, Bulgarian, etc. (See SLAVS or SLAVONIANS.) The Czech (Bohemian) language or dialect was the first of the Slavonic idioms which was cultivated scientifically. It is spoken in Bohemia, Moravia, with slight variations in Austrian Silesia, in Hun-

BOHEMIAN LANGUAGE AND LITERATURE

gary, and in Slavonia. Three chief dialects of this language are recognized, namely the Bohemian or Czech proper, the Moravian of Moravia and Silesia, and the Slovak of Hungary. The Bohemian alphabet consists of 42 letters, expressing a great variety of sounds. The English sound of *ts* the Bohemian expresses with *c*, the English *y* with *g*, the *sh* with *ss* or *s*, the Italian *ce* or *ci* with *c* modified, the French *ge* and *gi* with *s*, the Italian *u* with *y*, the *gn* with *n*, the English *w* with *w*, particularly at the end of words. The sound of entire words, not that of the single letters which compose them, determines the roughness or smoothness of their pronunciation. The terminations of the various declensions and conjugations are mostly vowels, or the smoother consonants. In general, the Bohemian has a natural melody like that of the Greek.

The Bohemian language, moreover, has much expressiveness and energy, as it is not weakened by a number of articles, auxiliary words, conjunctions, and words of transition, but is able to represent the objects of imagination, of passion, and all the higher emotions of the poet and orator, in a lively manner; by its brevity, heaping together the most significant words, and arranging the connection of the parts of speech according to the degree of feeling to be expressed, so as to give the style, spirit, and energy, or gentleness and equability. Like various other tongues, it designates many objects by imitation of natural sounds. Thus the names of many animals are taken from their voices, as *kruta*, the turkey; *kachna*, the duck. Many plants are named from their effects, as *bolehlaw*, hemlock (from headache). The conciseness of the language is increased by the absence of auxiliaries in the greater part of the verbs. The preterites, in the third person singular and plural, express a meaning still further condensed, as the variation in the last syllable is made to designate the sex; for example, *psal*, *psala*, *psalo*, he, she, it, has written; *psali*, *psaly*, *psala*, they have written. In like manner the Bohemian saves many prepositions and much circumlocution of other kinds, by the use of the *instrumental*, agreeing with the Latin ablative; for instance, *secenjm mece hlavu mu st' al* (*t* read like *te*), "with a blow of the sword he has cut off his head." This language is, therefore, very well fitted for the translation of the Latin classics. By the use of the past participle active the Bohemian can designate, as well as the Greek, who has really performed the action contained in the predicate of the accessory clause, which the Latin, with its ablative absolute or participle passive, must leave always undefined and dubious. The same kinds of actions performed with different implements are often expressed by peculiar words; for example, the verbs *sjti*, *strjhati*, *krágeti*, *rezati*, denote to cut with the scissors, with the sickle, with the knife, and with the scythe. In the subtlety of grammatical structure the Bohemian is like the Greek, and has the advantage over the Latin and other languages. In speaking of two hands, two eyes, etc., the dual number is used; for example, *ruce*, *oci*, etc. The language is also capable of expressing the idea of duration, referring to an indefinite past time, like the Greek aorist; for instance, *kupowal dum*, *alc nekaupil ho*, he was engaged in buying the house, and did not buy it. The language affords several preterite tenses,

distinguished with great subtlety, as *kaupil*, he has bought once; *kupowal*, he had purchased for a long time; *kupowáwal*, he had purchased formerly several times; *kupowáwáwal*, he seldom had purchased in former times; moreover, by adding the auxiliary verb *byl*, a time still longer passed may be expressed, though this is very seldom used; for instance, *byl kupowáwal*, he had purchased in times long past. Another advantage of the language consists in the various future tenses by which the Bohemian denotes not only the time but also the duration, and the more or less frequent repetition of the action; for instance, *kaupjm*, I shall purchase once; *budu kupowati*, I shall be purchasing for a long time; *budu kupowáwati*, I shall purchase several times; and *budu kupowáwáwati*, I shall be purchasing very often. Not less manifold in signification, and equally subtle in the determination of time, are the participles and the participial constructions. The determination of sex and number by the final syllable of the participle gives the Czech language no small advantage over others. Small connective particles of speech the Bohemian has in common with the Greek. The Greek *alla*, *men*, *gar*, *de*, *te*, etc., agree with the Bohemian *ele*, *pak*, *usak*, *li*, *s*, *t'*; only the three latter are always affixed to a word. Finally, the free, unrestrained arrangement of the words contributes much to perspicuity, as the Bohemian is less fettered than almost any other modern language to a particular order.

Bohemian Literature has been divided historically into five periods. The first extends from mythological times to 1409. It affords no written documents of remote antiquity. We know, however, that the language at an early period was similar to the present from the names of the gods, dukes, rivers, cities, and mountains which have been preserved, such as Perun, Przemyśl, Borzwog, Wltawa, Bila, Praha, Tetin. The Slavonian apostle Method, and the philosopher Constantine, called *Cyril*, made the Slavonians in Moravia acquainted with Christianity. Thence it penetrated to Bohemia, and thus the people of this country received the Græco-Slavonic ritual in the year 845. The same Constantine invented for the sounds of the Slavonic language the Cyrillo-Slavonic alphabet, borrowed mostly from the Greek. In later times the Glagolitic alphabet sprang up, of which, however, less use was made. When the Latin Church supplanted the Greek in Moravia and Bohemia, the Latin alphabet came also into use instead of the Cyrillic. In Bohemia the Cyrillic character remained in use only with the monks of Sázawa, who observed the Slavonic ritual. As the Latins endeavored to annihilate all the writings of the old ritual, and the Slavonic language was, in many cases, obliged to give way to the Latin, Bohemian literature suffered incalculable injury; hence we possess from the earlier centuries but a few insignificant remains in the characters above-mentioned. In the 10th century the Bohemians had a school at Kudet, in which they learned Latin. Their most ancient relic is the hymn (*Hospodine Pomilujny*) of Bishop Adalbert (*Wegtech*), a native Bohemian, sung to the present day even by the Russians and Poles. The Bohemians possess some remains of a collection of lyric-epic national songs, without rhyme, which seem to have been of great merit. The manuscript appears to have been written in 1290 and 1310. Goethe

BOHEMIAN LANGUAGE AND LITERATURE

found these national songs worthy of particular attention. Under the Emperor Charles IV., who promoted the cultivation of the Bohemian language, the University of Prague was founded in 1348. In the Golden Bull he commanded the sons of the German electors to learn the Bohemian language. Under his son, the Emperor Wenceslas, all decrees were written in Bohemian, which formerly were in Latin. Prague was then not only the most populous city in this part of Europe, but also, on account of its splendid court and the wealth of its citizens, the centre of the arts and sciences. Almost all the intellectual currents of the West found entrance into Bohemia, and German literature in particular had a powerful influence. The heroes of the Alexandrian and Arthurian cycles of romance became familiar to the Czechs in their own language. Dalimil Mezericky wrote a history of Bohemia in verse; Ondreg Z. Dube, a collection of Bohemian laws, in three volumes; Warinec Z. Brezowa, a history of the Roman emperors, and translated Mandeville's 'Travels'; and Pribik Pulkawa, a Bohemian history. This period affords also many vocabularies, poems, songs, and translations.

With Huss began the second period, from 1409 to 1500. The prevalence of religious disputes caused the Bible to be generally read and understood. Huss of Hussinetz translated Wickliffe's book, 'Triologus,' into the Bohemian tongue, and sent it to the laymen as presents. The 'Treatise of the Six Errors' he caused to be inscribed in Bohemian on the walls of the chapel of Bethlehem. He wrote his first collection of sermons when at the castle of Kozy (1413), besides an 'Appeal to the Pope,' 'Commentary on the Ten Commandments,' an 'Explanation of the Twelve Articles,' two sermons on the Antichrist; the 'Triple Cord,' and several excellent hymns. His letters from the dungeon in Constance to the Bohemians were translated by Luther into Latin, accompanied with a preface, and printed at Wittenberg in 1536. He and Jakobellus and Jerome improved and distributed the Bohemian Bible, of which several copies have been preserved to our times. Of Ziska of Trocnov, one of the greatest generals in history, several letters and his rules of war have been preserved. From this period have come down to us, several war songs of the Taborites, also some songs of Prague. Martin Lupac undertook, with the assistance of some learned men, the labor of retranslating the whole New Testament. The church service was now performed entirely in the Bohemian language. Mladienowic, an eye-witness of the execution of Huss, wrote an account of his life. This used to be read in the Bohemian churches. Procopius continued the rhyming chronicles of Dalimil. Lodkowic related his 'Journey to the Holy Sepulchre,' Sasek of Mezhyor wrote 'Notes and Travels Through Germany, England, France, Spain, Portugal, and Italy of the Bohemian Baron Loew of Rozmital and Vlatna' (whom he accompanied), a contribution to our knowledge of the manners of the 15th century, published in a German translation at Brunn (1824). M. Gallus, Albjk, Chrislan, Zidek, J. Cerny, J. Blowic, and Sindel, wrote on medicine, astrology, and agriculture. As early as 1447 we have an anonymous work on the grafting of trees. We have also the rhyming legend of the 10,000 knights, a translation of the fables of Æsop, the

council of the beasts and birds, in prose and verse, in three volumes (Placj Rada). Each lesson, which flows in rhyme from the mouths of the animals, is preceded by the natural history of the animals and the moral. It was printed three times in the Bohemian language, and published at Cracow in Latin verse (1521, 4to). Of the Bible 14 translations have come down to us, besides 10 of the New Testament. The oldest, of the year 1400, is in Dresden. The typographic art made a rapid progress in Bohemia. The first printed work was the Epistle of Huss from Constance, in 1459; the second, 'The Trojan War,' in 1468; the third, a 'New Testament,' in 1474; the whole Bible, in 1488; the first almanac, in 1489.

The third age, from 1500 to 1620, may be called the golden age of the Bohemian language. The cultivation of learning—in other countries, with only a few exceptions, the monopoly of the clergy—was in this favored land open to the whole nation. All branches of science were elaborated, and brought to an uncommonly high degree of improvement for that time. Gregory Hruby of Geleni translated the work of Petrarch 'De Remediis utriusque Fortunæ.' W. Pisecky translated from the Greek the 'Exhortation of Isocrates to Demonikos.' John Amos Comenius wrote 54 works, some of which were very excellent. He published his 'Janua' and an 'Orbis Pictus,' which were translated in his lifetime into 11 languages, have passed through innumerable editions, and are not yet surpassed. In all the north of Europe Comenius attracted attention by his projects for improving education, which were deliberated upon even by the diet of Sweden and the Parliament of England. The hymns of this and the earlier ages, part of which have been translated by Luther, may serve as standards for all languages. In Prague alone there were at this period 18 printing presses, in the country towns of Bohemia 7, and in Moravia also 7; many Bohemian books, too, were printed in foreign countries, as in Venice, Nuremberg, Holland, Poland, Dresden, Wittenberg, and Leipsic.

The fourth period begins with 1620 and ends with 1774. After the battle at the White Mountain, the whole Bohemian nation submitted entirely to the conqueror. The population of most of the cities and of whole districts migrated in order not to be false to their faith. More than 70,000 men, and almost the whole of the nobility, all the Protestant clergy, scholars, and artists, in general the most cultivated part of the nation, left their native country. Of these emigrants the greater part formed the flower of the army of Count Mansfield. Hence the Thirty Years' War depopulated Bohemia more than any other country, since these fugitives endeavored to regain their native country by repeated invasions. The fugitives established at Amsterdam, Dresden, Berlin, Breslau, and Halle printing presses, and sent to their brethren in Bohemia, Moravia, and Hungary a number of books, mostly new editions. Some Bohemians who observed the decay of their language strove to remedy it; as Pesina Z. Cechorodu; Joh. Beckowsky, who continued the Bohemian history to 1620; W. Weseley, who wrote a work on geometry and trigonometry, etc.; but the decay was too great to admit of being checked; the nobility had become strangers, and the government encouraged only German literature. From this time, there-

BOHEMOND I. — BÖHME

fore, the Bohemians wrote more in the German language.

In the fifth period, from 1774 to the present time, a new ray of hope shone on Bohemian literature, when, under the Emperor Joseph II., a deputation of secret Bohemian Protestants, trusting to his liberal views, made him acquainted with the great number of their brethren of the same faith. He perceived the necessity of introducing toleration, and hundreds of thousands of Protestants in Bohemia and Moravia came to light: their concealed works were printed anew, their classical language was again acknowledged and cultivated. Under this protection many men of merit, mindful of the fame of their ancestors, endeavored to cultivate anew all branches of the sciences, and to rival, if possible, the results attained by their more advanced neighbors. From about the year 1820 great activity was manifested by the Bohemian writers in the various departments of literature. A little before this Milton's 'Paradise Lost' was translated into Bohemian, and subsequently Shakespeare's dramas, or most of them, were likewise translated, the native drama being also cultivated. Kollar and Chelakovsky distinguished themselves in poetry, and perhaps even more Hynek Macha, whose poem 'May' is said to still maintain an influence over Bohemian poetry. Kollar and Chelakovsky were advocates of the Pan-Slavic movement. The chief work of the former was 'Slava's Daughter,' a long lyric-epic poem. Several writers became well known as novelists, some of them following the lead of Sir Walter Scott. Jungmann (the translator of Milton), brought out a valuable 'History of Czech Literature,' and Schafarik his 'History of the Slavonic Language and Literature' and his 'Slavonic Antiquities.' Among more recent poets of note may be mentioned the names of Halek Heyduk and Neruda, but it must be admitted that few Bohemian writers have become generally known, even by name, to the European reading public.

Bohemond I., the son of the Norman adventurer Robert Guiscard, who rose to be Duke of Apulia and Calabria: b. 1056; d. 1111. He became familiar with warfare when a mere boy, took a prominent part in various expeditions to Greece and Illyria against Alexis Comnenus, and repeatedly defeated his troops with a very inferior force. As eldest son Bohemond naturally expected to succeed his father, but when the succession opened in 1085 Bohemond was absent in Greece, and his younger brother Roger, having obtained possession of the paternal inheritance, declared his determination to maintain it. A war between the brothers was followed by an arrangement which gave Bohemond nothing more than the principality of Tarentum. While assisting his brother at the siege of Amalfi he resolved to become a crusader, and without waiting to complete it he harangued the troops so effectually on the glory to be gained in the Holy Land that the great body of them at once joined his standard. Bohemond was soon on his march, and after encountering considerable difficulties reached the scene of action. The Crusaders had laid siege to Antioch, but had made little progress and were beginning to despair of success, when Bohemond found means to gain over an Armenian renegade, who undertook to introduce him and his men by night, and thus give them possession of the town. Bohemond

laid the matter before his fellow-chiefs, and in doing so stipulated that in the event of success he himself should be prince of Antioch. The Armenian kept his promise, and accordingly in 1098 Bohemond was installed in his sovereignty, which he retained ever after, and at his death transmitted it to his son, who assumed the title of Bohemond II.

Böhlay, bé'län, Helene, German novelist: b. Weimar, 22 Nov. 1859. She shows now and then a leaning toward the romantic school, but on the whole her high power of description is realistic and her writings are imbued with passion. Among her novels are 'Under Death's Ban' (1882); 'Guilty of a Pure Heart' (1888); 'In Fresh Water' (1891).

Bohlen, Peter von, pä'tér fön bö'län, German Orientalist: b. Wuppels, Oldenburg, 9 March 1796; d. Halle, 6 Feb. 1840. He spent the first 20 years of his life in straitened circumstances, but his talents and perseverance attracted attention, and he obtained admission to the Hamburg gymnasium. He afterward studied the Eastern languages at Halle and Bonn; and he obtained an appointment at Königsberg, first in 1825 as extraordinary, and afterward in 1830 as ordinary professor of Oriental literature. Bohlen has left many works, which fully support his title to the high place which he held among Oriental scholars. One of the most important is a work entitled 'Das alte Indien' (1830-1), not yet superseded by any other work on the same subject. The details of his life are given with great minuteness and honesty in an 'Autobiography' (1841), which is full of interest, and cannot be read without producing a full conviction that he was no less distinguished by his amiability in private life than by his literary acquirements.

Bohlen Lectures, a lecture course established in 1875 on a foundation of \$10,000 bequeathed by John Bohlen, a lay member of the Protestant Episcopal Church. They are delivered each year in Philadelphia, Pa., by eminent representatives of that Church. Among the most notable are those upon 'The Influence of Jesus,' by Bishop Brooks, and the 'Fitness of Christianity to Man,' by Bishop Huntington.

Böhm, bém, Theobald, Bavarian musician: b. Munich, 9 April 1798; d. Munich, 25 Nov. 1881. He is best known for his improvements in the construction and fingering of the flute. He wrote 'Ueber den Flötenbau und die neuesten Verbesserungen desselben' (1847), and 'Die Flöte und das Flötenspiel.'

Böhme, or Böhm, Jakob, yä'kōb bé'mè, one of the most renowned mystics of modern times: b. 1575, Altseidenberg, a village in upper Lusatia; d. Görlitz, November 1624. Boehme being the son of poor peasants, remained to his 10th year without instruction, and employed in tending cattle. Raised by contemplation above his circumstances, and undisturbed by exterior influences, a strong sense of the spiritual, particularly of the mysterious, was awakened in him, and he saw in all the workings of nature upon his mind a revelation of God, and even imagined himself favored by divine inspirations. He became afterward a shoemaker; and this sedentary life seems to have strengthened his contemplative habits. In 1594 Böhme became a master shoemaker in Görlitz, married, and continued a shoemaker during his life, but with-

drew himself more and more from the world. If we take into view his retirement, his piety, his rich and lively imagination, his imperfect education, his philosophical desire for truth, together with his abundance of ideas, and his delusion in considering many of those ideas as immediate communications of the Deity, we have the sources of his doctrine and his works. His first work, 'Aurora, oder die Morgenröte,' was written in 1616, and contains his revelations on God, man, and nature. This gave rise to a prosecution against him; but he was acquitted, and called upon from all sides to continue writing. One of his most important works is 'Description of the Three Principles of the Divine Being.' His works contain profound and lofty ideas, mingled with many absurd and confused notions, but the basis of his thought is the theory that everything exists and becomes intelligible only through its opposite. The first collection of his writings was made in Holland in 1675 by Henry Betke; a more complete one in 1682 by Gichtel (10 vols. Amsterdam), from whom the followers of Böhme, a religious sect highly valued for their silent, virtuous, and benevolent life, have received the name Gichtelians. Another edition appeared in Amsterdam in 1730 under the title 'Theosophia Revelata,' (2 vols.); the most complete in six volumes. In England, also, Böhme's writings have found many admirers. William Law published an English translation of them, two volumes. A sect, taking their name from Böhme, was likewise formed in England, and in 1697 Jane Lead, an enthusiastic admirer of his, established a particular society for the explanation of his writings, under the name of the Philadelphists. In very recent years his views have taken on fresh importance, his fundamental principle having been perceived as akin to that underlying the philosophical systems of Spinoza, Schelling, and Hegel. See Hartmann, 'Life and Doctrines of Böhme' (1893).

Bohn, bôn, Henry George, English publisher, of German parentage: b. London, 4 Jan. 1796; d. Twickenham, 22 Aug. 1884. On completing his education he worked for a time under his father, but about 1831 started business on his own account as a second-hand bookseller, and in 1846 he began the issue of his famous libraries. The first of these was the Standard, succeeded in the following year by the Scientific and the Antiquarian, in 1848 by the Classical, and from then till 1853 by the Illustrated, the Shilling, the Ecclesiastical, the Philological, and the British Classics libraries. The whole number of volumes contained in these series exceeded 600. In 1864 and subsequent years he sold all his copyrights and other business property, thus realizing a sum of nearly \$500,000. Among his own works were: 'The Origin and Progress of Printing' (1857); 'Biography and Bibliography of Shakespeare' (1863); 'Dictionary of Quotations' (1867); 'Handbook of Proverbs'; 'Handbook of Games'; 'Guide to the Knowledge of Pottery and Porcelain'; and editions of Lownde's Bibliographer's Manual and Addison's Works.

Bohol, bô-hôl', Philippines, an island belonging to the Visayas or Bisayas group. It has an area of about 1,300 square miles and an estimated population of about 245,000. Sugarcane is grown and the island is reputed rich in

gold deposits. The most important town is Tagbilaran, a port on the southwest coast. In the north is Calape. These ports were officially declared open to commerce 11 Dec. 1899. The Visayas dialect prevails throughout Bohol.

Bo'hor, an east African antelope (*Cervicapra bohor*), one of the reitboks.

Bohtlingk, bet'link, Otto von, German Sanskrit scholar: b. St. Petersburg, 11 June 1815; d. 16 April 1904. He received his education in his native city, and in 1853 removed to Germany. In 1842 he returned to St. Petersburg, but subsequently lived much in Jena and Leipsic. His chief work is a Sanskrit-German dictionary in seven volumes, prepared in conjunction with Prof. Roth of Tübingen (1853-75). In 1879-89 he issued a smaller edition giving the meanings (with considerable additions), but omitting the quotations.

Boiardo, Matteo Maria, mǎ-tǎ'ô mǎ-rē'a bô-yār'dô (COUNT OF SCANDIANO), Italian poet: b. near Ferrara, 1434; d. Reggio di Modena, December 1494. From 1488 to 1494, the period of his death, he was commander of the city and castle of Reggio, in the service of his protector, Ercole d'Este, Duke of Modena. This accomplished courtier, scholar, and knight was particularly distinguished as a poet. His 'Orlando Innamorato' (1496) is continued to the 79th canto, but not completed. He immortalized the names of his own peasants and the charms of the scenery at Scandiano in the persons of his heroes and his descriptions of the beauties of nature. In language and versification he has been since surpassed by Ariosto, whom he equaled in invention, grace, and skilful conduct of complicated episodes. Domenichi, Berni, and Agostini new modeled and continued the work of Boiardo without improving it. One continuation only will never be forgotten—the Orlando of Ariosto. In some of his works Boiardo was led by the spirit of his times to a close imitation of the ancients—for example, in his 'Capitoli'; also in a comedy borrowed from Lucian's 'Timon'; and in his Latin eclogues and translations of Herodotus and Apuleius. In his sonnets and *canzoni* (first printed at Reggio, 1499) he has displayed great talents as a lyric poet.

Boiars. See BOYARS.

Boieldieu, Adrien François, â-dre-ên frân-swa bwāl-dyê, French composer of distinction: b. Rouen, 15 Dec. 1775; d. Groshois, 8 Oct. 1834. He early displayed great musical talent, and at 18 wrote an opera, 'La fille coupable,' which was performed with great applause. In 1795 he went to Paris, and rose rapidly in reputation, producing several operas and various other pieces which have become classical. Such as 'Le deux lettres'; 'La famille Luissé'; 'Calife de Bagdad'; and 'Ma tante Aurore.' When the Conservatoire de Musique was established he was nominated a professor. In 1803 he went to Russia as *maitre de chapelle* to the Emperor Alexander, but returned to Paris in 1811, and subsequently composed 'Jean de Paris' (1812); 'Le chaperon rouge' (1818); 'La Dame blanche,' his masterpiece (1825); 'Les deux nuits' (1829). The 'Calife de Bagdad'; 'Jean de Paris,' and 'La Dame blanche' still hold the stage and continue popular.

Boies, Horace, American statesman: b. Aurora, N. Y., 7 Dec. 1827. He went to Wisconsin in 1844; and after working on a farm returned, studied law and was admitted to the bar in 1849. He practised at and near Buffalo till 1867, becoming active in Republican politics during this period; and in the last year removed to Waterloo, Iowa, where he continued law practice. His opposition to the tariff and prohibition policy of the Republican party caused him to unite with the Democrats; and, in 1890-4, he served two terms as governor of Iowa, being defeated for a third term in 1893. He was a conspicuous candidate for the presidential nomination in the National Democratic conventions in 1892 and 1896; and in the campaign of 1896 he supported Bryan.

Boii, bōi-I, a Celtic people, who at first inhabited Transalpine Gaul. Their original seat is supposed to have been between the upper Saône and the higher parts of the Seine and Marne. They migrated to Cisalpine Gaul, crossed the Po, and established themselves between it and the Apennines, in the country previously occupied by the Umbrians. They are found, 396 B.C., engaged along with the Insubres and the Senones, two other tribes of Cisalpine Gaul, in the capture and destruction of Melpum, a neighboring city, of which the site and history are unknown. They united their forces with the Etruscans, 283 B.C., after the defeat of the Senones, and were defeated by the Romans at the Vadimonian Lake, the scene of a previous defeat of the Etruscans. After another defeat they made a peace with the Romans, which was preserved for 45 years, when the occupation of the territory of the Senones by the latter led to another war, in which the Boii were again defeated. At the commencement of the second Punic war, 218 B.C., they again attacked the Romans and supported Hannibal. From this period they were engaged in almost constant war with the Romans till they were completely subdued by Scipio Nasica, 191 B.C. Many of them were put to the sword; the remainder were at length compelled to migrate, and crossing the Alps found a refuge among the Tauriscans, a kindred tribe in the territory of modern Bohemia, to which the Boii have given their name. They were afterward driven out or exterminated by the Dacians (some say the Marcomans). Part of them migrated about 58 B.C. to Bavaria. The Boii, like the other Gauls, were a people of considerable civilization, possessing a strong love of independence, and formidable from their military disposition and virtues.

Boil, a superficial or deep localized inflammatory process of the skin leading to the destruction of tissue and the formation of pus. In practically all instances some form of infection by a micro-organism, usually the *Staphylococcus pyogenes aureus*, is present in boils. In the superficial varieties, the bacteria enter the hair follicles or the sebaceous glands and travel down beneath the skin and here either set up a process of destruction or continue one already begun by a wound. There results a local swelling; with exquisite tenderness, and later a pointing and discharge of the purulent detritus from the boil. In the deep-seated varieties similar processes are in action, but the heading and discharge of the boil is de-

layed. The marked tenderness is due to the involvement of the nerve fibres in the tissues immediately surrounding the inflammatory centre. The predisposition to the formation of boils varies widely, some people being particularly prone to them. They are apparently more liable in those who are "run down," or in those whose tissues are non-resistant. Boils are of commoner occurrence following the winter time of housed individuals, combined with the renewed activities of the skin in the warm spring atmosphere, and they occur following the depressed states of many diseases, and particularly as a result of excessive athletic exercise, "over-training." Faulty diet and hygiene are responsible for many of them. In their treatment attention to the intestines is imperative. Tonics, particularly those containing some forms of sulphur, are of value. Proper hygiene of the skin is imperative. For the immediate treatment heat is helpful. This is usually applied as a hot flax-seed poultice, preferably, combined with a mild antiseptic; two per cent carbolic acid, being excellent. Early and complete incision is also advisable.

Boileau Despréaux, Nicolas, nik-ō-la bwā-lo dā-prā-ō. French poet of distinction: b. Paris, 1 Nov. 1636; d. there, 13 March 1711. He applied himself at first to the study of the law and afterward of theology, but devoting himself eventually to the pursuit of literature. He produced, within the space of 40 years, a vast number of works, the most important of which is that on the art of poetry, establishing an æsthetic code for all forms of poetical composition. His satirical poem, 'Le Lutrin,' and the 'Dialogue des héros de roman,' must also be particularly mentioned. His other writings comprise translations of the classics, miscellaneous effusions on art, music, and poetry, and his famous epistles, of which those treating of 'Le respect humain,' 'La connoissance de soi-même,' and 'Plaisirs de la campagne' are the best. When Boileau began to write, Montaigne, Pascal, Malherbe, Corneille, Molière, La Fontaine, and other eminent authors, had already made their appearance; yet the people were slow to appreciate the genius of the new school, to which they preferred the previous mediocre and imitative writers. Boileau's great achievement was to cure this perversion of taste. Like his friend Racine, he was historiographer of Louis XIV., and the recipient of an annual pension of 2,000 francs. His admission to the French Academy did not take place before 1684, owing to his attacks upon some of the members. The latter part of his life was passed in neglect and troubles, which accelerated his death. He left the reputation of a genial, high-minded, and generous man. The best edition of his works is by Gidel (1870-3). See Deschanel, 'Le romantisme des classiques,' 4th series (1888); Faguet, 'XVII. Siècle, Etudes littéraires' (1887); Hemon, 'Cours de littérature' (1889-95); Lanson, 'Boileau' (1892); Morillot, 'Boileau' (1892).

Boiler, in steam engineering, a closed vessel for the generation of steam under pressure. In days when steam pressures did not exceed a few pounds to the square inch, many forms of boiler were used, that are now out of the question, on account of the intrinsic weakness of their forms. At the present time,

BOILER

when steam pressures are often carried as high as 150 or 250 pounds to the square inch, the strictest attention must be paid to every trifling detail of design and construction, in order to ensure the safety of the structure. The fanciful shapes that prevailed in the days of Watt and other early steam engineers have perforce disappeared, and given place to a limited number of standard types that have been found to be capable of withstanding the severe conditions of modern practice. The types at present in use may be divided into two general classes, according as they are "internally fired" or "externally fired"; that is, according as the fire which furnishes the energy for the formation of steam is contained within the general contour of the boiler, or is situated externally to it. Internally fired boilers are the rule in England, but a large majority of the boilers in use in the United States are fired externally.

Internally Fired Boilers.—The Cornish and Lancashire boilers are the commonest internally fired types. Each consists of a cylindrical shell with flat ends or "heads." In the Cornish type the boiler is traversed from end to end by a large flue, which is often corrugated, to increase

smaller size of its flues. The Galloway boiler does not differ in any essential particular from the Cornish or Lancashire types, except that its flues are crossed by conical-shaped water tubes, which serve the double purpose of increasing the heating surface, and of stiffening the flues that they traverse. The conical shape is adopted for the cross-tubes chiefly on account of the ease with which tubes of this form can be put in position, by passing the flange of the smaller end through the opening to which the larger end is to be riveted.

The Scotch, or cylindrical marine boiler, shown in Fig. 1, is a very common type in marine practice. It contains several furnaces (three in the illustration), which are usually corrugated. These furnace-flues do not pass through the entire length of the boiler, as in the Cornish and Lancashire types, but each is connected, within the boiler, to a separate "combustion chamber." The products of combustion pass from the furnace back into the combustion chamber, and then return to the front end of the boiler through banks of small tubes which occupy the water space of the boiler, above the furnace. A "breecing" (or hood) of sheet steel, secured to the front of the boiler, then receives them, and conducts them to the stack.

Among the kinds of internally fired boilers that are more familiar to the engineers of the United States, the vertical tubular boiler and the locomotive boiler deserve special mention. The vertical tubular boiler consists of a cylindrical shell, with flat heads at the top and bottom, and traversed by a large number of small vertical tubes. The Manning boiler, shown in Fig. 2, is a good example of this type. At the lower end, the shell of this boiler is enlarged to provide a greater space for the fire-box than could be had if the shell were of the same diameter all the way. Another object that the designer had in view, in increasing the diameter of the shell in this way, was to give the boiler a certain degree of elasticity. The tubes are often hotter, in service, than the outer shell; and hence they tend to expand more, and thus throw stresses upon the heads and the tube ends. The reversed flange by which the main shell is secured to the fire-box is supposed to yield sufficiently, under the bending stress thus thrown upon it, to relieve the more vulnerable parts of the boiler from the expansion strains to which they would otherwise be subjected. The fire-box of the Manning boiler is surrounded by an annular space containing water, the inner plates of this space (or "water leg") being secured to the outer ones by screw stay bolts that are spaced evenly, at short distances, so that they form the corners of a system of small squares. These bolts are supposed to be screwed into each of the shells of the water leg, and afterward riveted over at both ends. They are also commonly made hollow, or drilled through lengthwise with a small hole, so that if one of them should break or corrode away seriously, the escaping steam or water would attract the attention of the fireman. Vertical tubular boilers are particularly useful when the available floor space in the boiler room is small; but they are often hard to clean out, and hence are not to be recommended when the water supply is known to form considerable deposits of scale matter. Such scale matter, in whatever part of

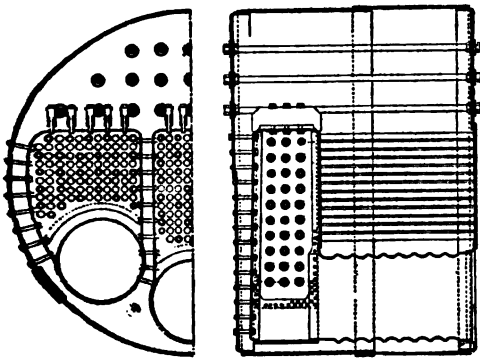


FIG. 1. The "Scotch," or Cylindrical, Marine Boiler.

its strength. The fire is built within this flue, upon a suitable grate at one end of the boiler; and the gaseous products of combustion, after passing through the flue, are returned along the outside of the shell, so as to give up still more of their heat to the water in the boiler. The large flue in the Cornish type is an element of weakness, since the tendency of a flue to collapse through the action of an external pressure increases very rapidly with the diameter of the flue. To guard against collapse, the long flue is often provided with strengthening rings, which are riveted to it externally at short intervals. The Lancashire boiler differs from the Cornish type chiefly in having two comparatively small flues in the place of a single large one. Such a construction is intrinsically stronger, and since there is a fire in each of the flues, the fuel can be replenished, and the fires cleaned, alternately. This implies a greater steadiness of pressure, and less strain upon the boiler from the chilling action of the comparatively cold air that enters and strikes against the heated flue-walls when the fire doors are opened. The Cornish boiler is cheaper to build, and the Lancashire boiler is harder to fire, owing to the

BOILER

the boiler it is formed, will eventually fall upon the lower tube sheet, or else into the water leg. That which falls into the water leg will do no great harm unless it is allowed to accumulate to an unreasonable extent. Handholes are

on the same level as the lower tube sheet, for a like purpose; but it is not so easy to remove the scale from this sheet as it is to remove it from the water leg. That which lodges around the edges of the tube sheet can be removed without any great trouble, but the deposit that lies toward the middle of the tubes can hardly be got at from the handholes. Yet it is of the highest importance that the tube sheet should be kept free from such deposits, because otherwise the ends of the tubes will become overheated and loosened, and serious mischief, or even disastrous explosion, may follow.

The locomotive boiler is built in a great variety of forms and proportions, but the fundamental principles of design are substantially the same in most of them. Like the vertical tubular boiler, it has a fire-box that is surrounded by a water leg on all sides, though it is open at the bottom for the discharge of ashes, and for the admission of air for combustion. The inner and outer walls of the fire-box are connected by stay-bolts, and the upper sheet of the furnace (technically known as the "crown-sheet") is supported in some efficient manner, so that the pressure of the steam shall not force it down out of position. The support thus necessary for the crown-sheet is sometimes afforded by running "sling stays" from it to the neighboring parts of the outer shell, and sometimes by providing parallel, horizontal girders over the sheet, these being secured to the crown-sheet, at short intervals, by means of hangers, or long, thimble rivets. Not infrequently these two methods of support are combined in the same boiler, as suggested in the illustration (Fig. 3). The products of combustion pass forward from the furnace, through a bank of small tubes that conduct them to a "smoke-box" or "extension" at the front end, to which the stack is attached. When the locomotive type of boiler is used in stationary practice, the draft required for combustion is provided by a chimney or tall stack, as in other types of stationary boiler; but when used in railway service it is impossible to obtain the draft in this manner, and a "blast-pipe" is therefore provided, through which the exhaust steam from the engine cylinders is discharged up the stack. The gaseous products of combustion are expelled from the "front extension" by the blast of steam, and an equivalent quantity of air is drawn up through the fire. The draft produced in this way is quite powerful. "Baffle plates" are therefore provided in the furnace, in many cases, to deflect the hot gases that come from the fire, and bring them into contact with a considerable portion of the surface of the fire-box, before they pass out into the tubes. The weakest points about the locomotive type of boiler are the crown-sheet and the stay-bolting. If sediment lodges upon the crown-sheet, and thereby keeps the water from direct contact with the metal there, overheating is sure to occur, and the sheet may become so softened and burned as to lose its strength, tear away from its fastenings, and permit the entire contents of the boiler to be discharged into the furnace. Many of the explosions of locomotive boilers are due to this action. The stay-bolting at the sides of the fire-box is likewise a source of frequent trouble, because it is found that the stay-bolts sometimes corrode away very rapidly, so that they are in reality badly wasted and weakened,

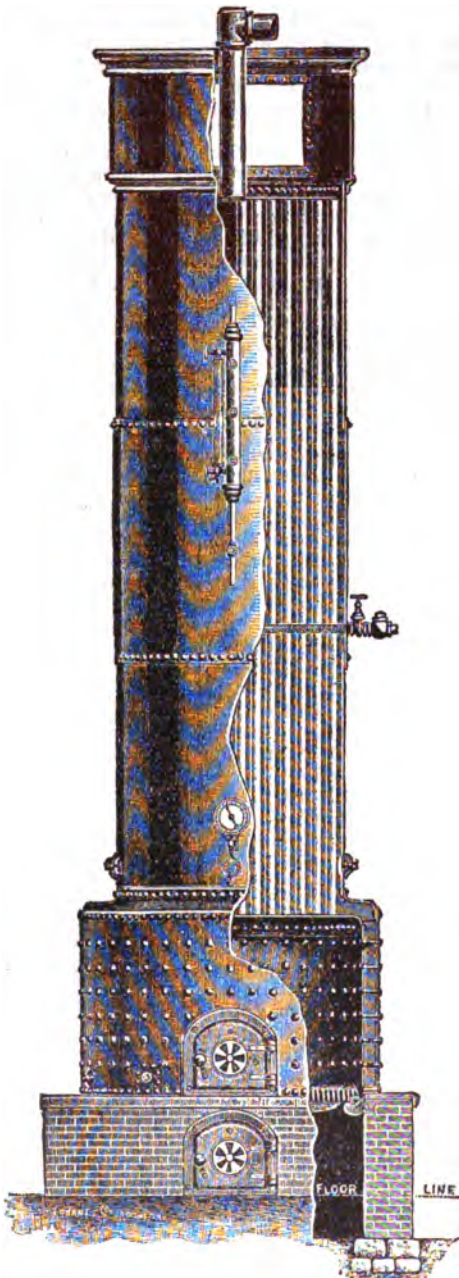


FIG. 2. The Manning Boiler.

provided along the bottom of the water leg, on the outer shell, and these should be opened as often as experience with the particular feed water that is used indicates to be necessary, and the water leg thoroughly freed from scale and mud. Handholes should also be provided

BOILER

when the engineer in charge believes them to be still sound and strong. As in the vertical boiler, the stay-bolts are made hollow so that they may automatically give notice of breakage by leaking. This artifice is helpful, but unfortunately it does not invariably work as it is intended to, and broken or badly corroded stay-bolts exist, not infrequently, without giving the alarm that they are supposed to give.

Externally Fired Boilers.—The commonest type of externally fired boiler, in the United States, is the horizontal tubular. The standard

underneath the boiler shell to the "combustion chamber" at the rear, after which they rise and return to the front end through the tubes. They then enter the "smoke box" at the front end, and finally pass upward into the flue that leads to the chimney. The weight of the boiler is sustained by means of cast-iron (or steel) projections, or "lugs," that are not shown in the illustration, but which are riveted to the shell, and rest upon the side walls of the brick setting. Three pairs of lugs are often provided, but two pairs are sufficient except when the

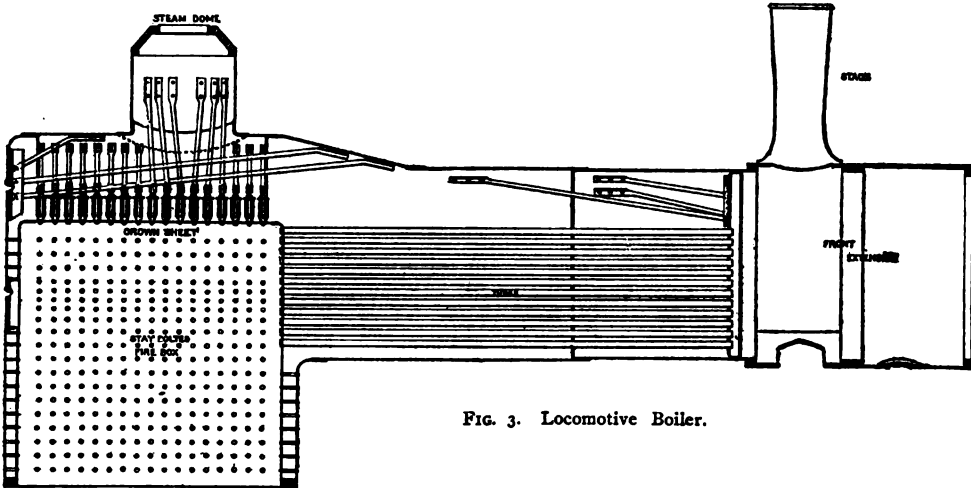


FIG. 3. Locomotive Boiler.

design of this boiler, according to the Hartford Steam Boiler Inspection and Insurance Company, is shown, with its brickwork (or "setting") partially torn away, in Fig. 4. It con-

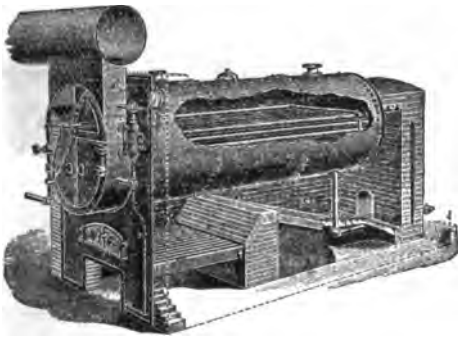


FIG. 4. Horizontal Tubular Boiler.

sists of a cylindrical shell, usually composed of three courses or "rings" of plates, riveted together. The circular joints in these boilers are almost invariably single-riveted; but the longitudinal joints are double-riveted, triple-riveted, or riveted in some even more substantial manner, according to the pressure that the boiler is to carry. The longitudinal joints, which are not shown in the engraving, should be high enough to be well out of the way of the hot gases from the furnace. A multitude of tubes extend through the boiler from end to end, and the furnace gases pass from the furnace back

boiler is very long; and two pairs can be brought to a good bearing upon the side walls more readily than three. The boiler should be "anchored" by the front pair of lugs, and the rear pair should be provided with rollers so that the boiler may expand and contract freely, without producing strains in the setting or in itself. The course of the feed-pipe, through which water is introduced into the boiler, is indicated quite plainly in the engraving. If there are several boilers set together in one battery, the main feed-pipe runs along the fronts, just under the projecting ends of the boilers. From this main feed-pipe a branch pipe is taken off for each boiler. The branch pipe is taken off on the left-hand side of the boiler, and near the main pipe it is provided with a ground union, or with a flanged connection. Immediately above the union there is a check valve, and above this is the globe valve which controls the feed. The feed pipe enters the boiler just above the tubes, and passes down the boiler on the inside, nearly to the back head. It then crosses over to the right-hand side, and discharges downward between the tubes and the shell. It is found by experience that when feed water is introduced in this way it becomes heated almost to the temperature of the water in the boiler before it is discharged, so that the annoying and often dangerous effects that are produced when the shell is chilled by cooler feed-water are entirely avoided. On large boilers the feed-pipe should have a diameter of at least an inch and a half. The blow-off pipe (which is used for drawing off the contents of the boiler) should be located at the rear end, and

BOILER

should enter the boiler at the bottom, and not through the back head. To strengthen the construction, the shell should be reinforced where the blow-off enters it, by a ring of boiler plate securely riveted in place, about the point of attachment of the blow-off. The neglect of this simple matter of reinforcement has led to many serious accidents, through the blow-off pipe pulling out and permitting the contents of the boiler to be discharged through the opening so made. As the blow-off is exposed to the action of the fire, it is also important that it should be encased in some sort of a protecting sleeve, as indicated by the dotted lines. A piece of larger pipe, slipped over the blow-off, is often used for this purpose, but it has the disadvantage of rendering the blow-off itself inaccessible for examination. A piece of asbestos rope coiled about the pipe is equally satis-

straight passage through them, and are therefore likely to catch and retain pieces of scale, which often prove to be very troublesome impediments. It should be mentioned that those parts of the heads of a horizontal tubular boiler that lie above the tubes are intrinsically weak, and must therefore be sustained in some manner. The necessary support is usually secured by running braces from the heads to the side of the boiler shell, though sometimes the braces are run through the entire length of the boiler, from one end to the other.

The horizontal tubular boiler has many excellent points, not the least of which is that it is accessible for examination and cleaning in practically every part. No boiler can be expected to work ideally when the feed water is bad, but the horizontal tubular type gives as good service, even under this trying condi-

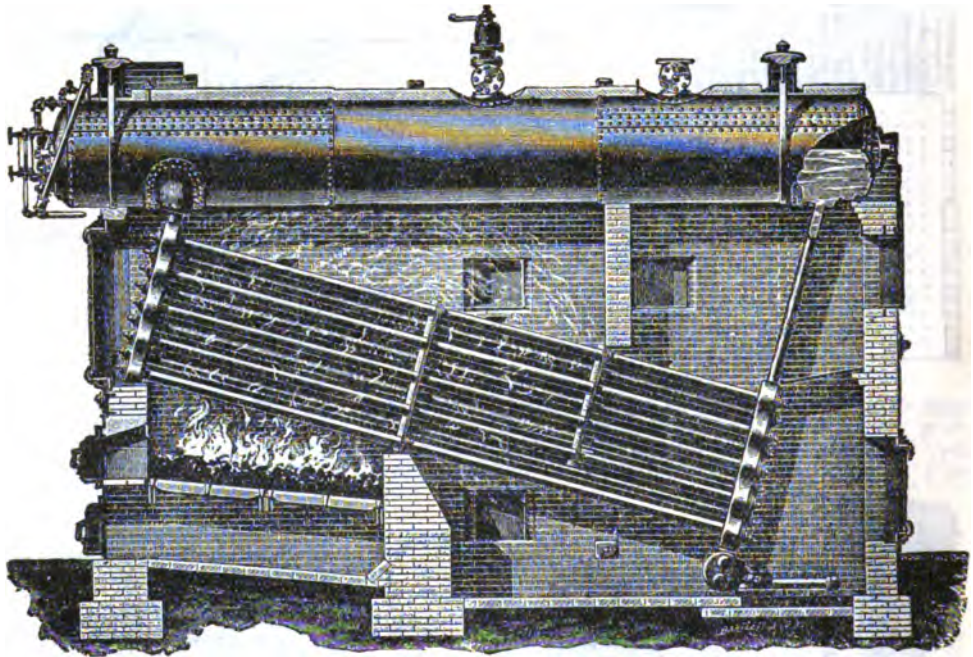
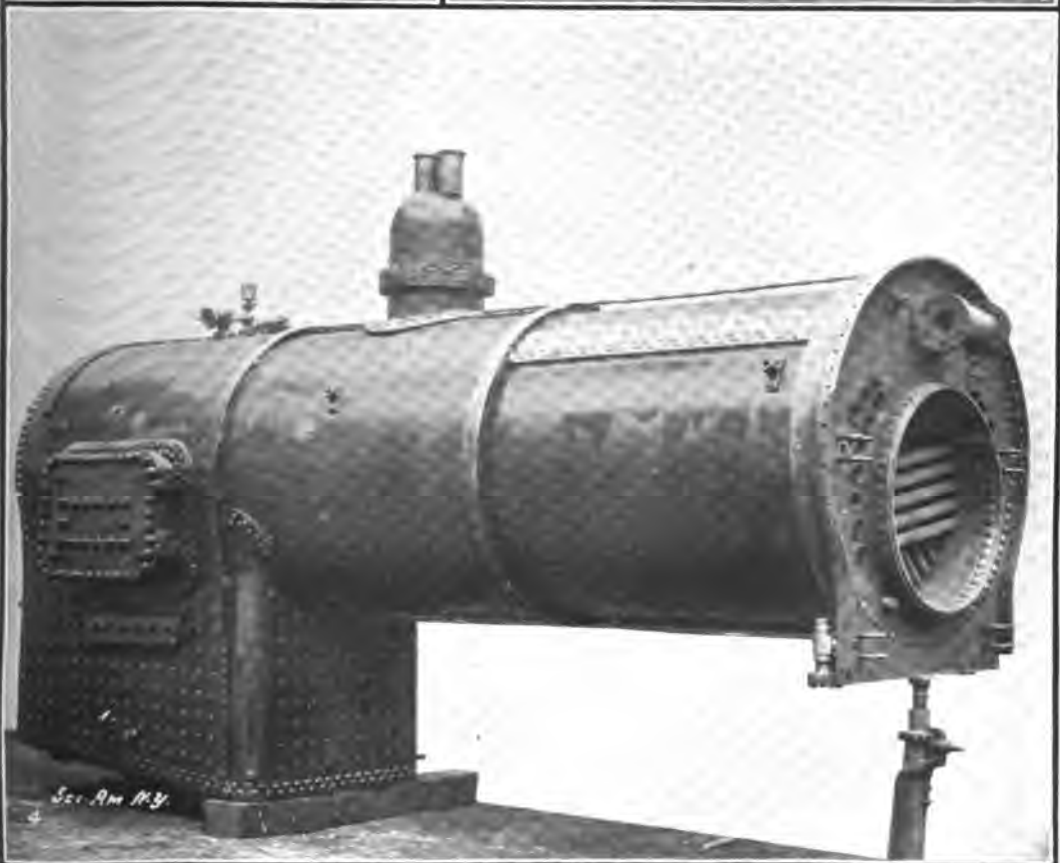
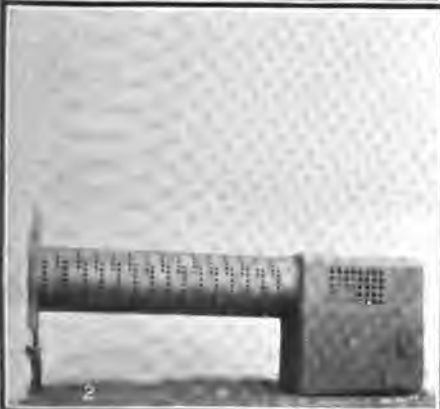
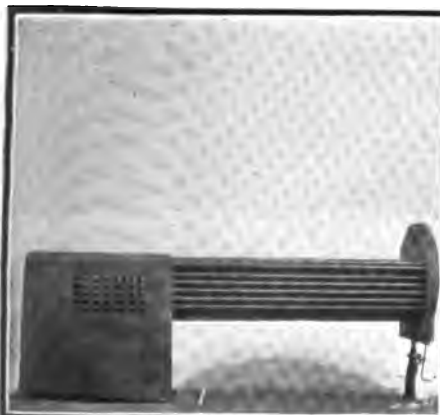


FIG. 5. The Babcock & Wilcox Water Tube Boiler.

factory, and permits of easy inspection of the pipe. The blow-off pipe of a boiler that is properly cared for is not likely to burn nor to become otherwise injured. Most of the accidents from the burning of such pipes have been primarily due to permitting the pipes to become choked up with mud or scale, so that water could not enter them freely from the boiler, to keep them properly cool. This may be almost certainly avoided by opening the blow-off (say) twice a day for a moment or two, until any sediment that may have fallen into it has been thoroughly swept out. The blow-off pipe is often so arranged that the elbow comes in the combustion chamber; but this is not good practice, and it is much better to carry the pipe down until it passes below the floor of this chamber. The pipe itself should be about two inches in diameter. It should be provided with a plug cock or with a gate valve, but a globe valve should never be used upon it, since valves of this type do not have a

tion, as can be had from any known type. Its weak points are (1) that it is not so well adapted to extremely high pressures as some of the water-tube types, of which one will be presently noticed; and (2) when it ruptures (as must happen occasionally with every type of boiler) the explosion is likely to be considerably more destructive than the explosion of a sectional boiler, because the large quantity of energy that it contains is liberated more suddenly.

Another class of externally fired boilers that is becoming more and more widely used, both in the United States and Europe, is the "water-tube" type, which is characterized by the fact that its tubular elements contain water, instead of serving for the transmission of the furnace gases, as in all the other forms that have been considered above. One of the best-known boilers of this class is the Babcock and Wilcox, which is shown in Fig. 5. This boiler is built up of lap-welded wrought-iron tubes, placed



AN ENGLISH WATER-TUBE LOCOMOTIVE BOILER.

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View Showing Auxiliary Fire-Tubes for stiffening Front End of Fire-box. 2 The Fire-box and Water-Tube Flue.
Side Doors Open, Showing Cross Water-Tubes in Fire-box. 3 Complete Boiler, Showing
Side Door to Fire-box and Front End of Flue with Cross Water-Tubes.

BOILER

in an inclined position, and attached, both at the front and at the rear, to an upper drum that is made of extra thick steel or iron plates, and double-riveted, or riveted with a butt-strapped joint. The tubes are not vertically over one another, but are "staggered," so that each tube comes directly over a space in the row below it. The boiler is suspended from wrought-iron girders, which rest upon iron columns that are entirely independent of the brickwork; and hence the brickwork may be repaired, or may even be removed altogether, without disturbing the boiler itself. The fire is situated under the front or higher end of the inclined tubes, and the products of combustion are guided by division plates and bridges so that after rising from the fire grate they pass between the tubes to the combustion chamber under the drum, then downward among the tubes again, and finally upward and to the chimney. This devious course, as well as the staggering of the tubes, is intended to bring the hot gases into intimate contact with the tubes at every point. As the water in the boiler becomes heated, it rises toward the higher end of the tubes, becoming meanwhile partially converted into steam. The column of mixed water and steam ascends into the drum, where its constituents separate, the steam remaining in the drum, while the water flows to the rear, where it passes down through the long, upright tubes, and so completes the circulation.

Water-tube boilers are now used to some extent in marine work, and especially in the naval service. Attention has been particularly directed to this branch of the subject by the recent elaborate investigations of the Commission appointed by the British Admiralty, for the purpose of recommending a standard type of boiler for use in the British navy. (See 'Engineering News,' 4 Sept. 1902, page 176.) The Belleville boiler, which has heretofore been somewhat extensively used in that service, is represented, diagrammatically, on plate. It consists essentially of a series of water-tubes, slightly inclined to the horizontal, and opening at the bottom into malleable iron collector boxes, and at the top into a drum to which the main steam pipe is attached. The feed water is introduced at the middle of the upper drum, and is injected under a pressure in excess of that which is carried upon the boiler itself. To prevent the comparatively cool feed water from entering any of the tubes in which steam is generated, these tubes are caused to project at least eight inches into the drum. The feed passes down through return pipes at the sides of the boiler, and enters the tubes below, after its temperature has been raised by the heat of the furnace sufficiently to prevent injury from contraction strains. The proper regulation of the feed-water supply is one of the difficult practical points about the Belleville boiler; and to overcome it as far as possible an ingenious automatic feed device is provided. As will be understood from an inspection of the engraving, there is little or no true circulation in boilers of this type. The tube-groups discharge a mixture of steam and water into the drum, where the steam is supposed to be freed from the water by the aid of a system of baffle plates that are not shown. An economizer is placed in the stack above the boiler in the most approved modern installations, the construction of the

economizer being similar to that of the boiler itself, except that the tubes composing the elements are smaller. The Commission already referred to reported somewhat unfavorably upon the Belleville boiler, but did not suggest any other special type of water-tube boiler for general use aboard ship. It inclined rather toward cylindrical boilers for ordinary purposes, with auxiliary water-tube boilers for emergencies.

All boilers are supposed to be provided with certain appliances intended to secure safety, and uniformity of working. Noteworthy among these are the safety valve, and the gauges that indicate the pressure of the steam and the position of the water level. These are described under separate headings.

The "horse-power" of a boiler is often spoken of; but the term is a loose one, without any definite significance, because the horse-power that can be realized from a boiler depends to a very great extent upon the engine that is used to develop the power, and upon how hard the boiler is forced. The Centennial Commission adopted, as the definition of a horse-power (when that expression is used in connection with a boiler), the "evaporation of 30 pounds of water per hour, when the temperature of the feed water is 100° F., and the pressure of the steam is 70 pounds per square inch, as read from the gauge."

Steam boilers may explode from any one of a great variety of causes. Of these three are specially worthy of mention: (1) The boiler may be poorly made or poorly designed, so that even when it is new it is not capable of safely withstanding the load that is put upon it. All boilers, however well made, should have a "factor of safety" of five; that is, they should be able to sustain a pressure five times as great as the regular working pressure, before bursting. (2) A boiler, originally good, may be wasted away, either locally or generally, by corrosion or other form of deterioration, or it may develop defects in service, which detract from its original strength sufficiently to lead to explosive failure. Competent periodical inspection will materially lessen the liability to explosion from causes of this sort. (3) The water in the boiler may become low, through neglect or through the failure of the feed-apparatus, so that the metal becomes overheated or burned, and loses its strength. This is the cause almost invariably assigned, by the general public and even by minor "experts," when the boiler explosion occurs, and the attendant is frequently censured for his carelessness when the explosion was really due to some totally different cause. When an explosion is attended by great manifestations of force and energy, it is safe to conclude that a plentiful supply of water was present; for a boiler full of heated water contains vastly more energy than one that is merely filled with steam at the same temperature. (See Thurston, 'Steam Boiler Explosions.') Pound for pound, steam contains more energy than water, when the two are at the same temperature; but cubic foot for cubic foot (and this is the way that the comparison should be made in reasoning about a boiler explosion), the water has an enormous advantage, owing to its greater density.

For further details concerning boilers, consult F. R. Hutton, 'The Mechanical Engineering of Power Plants'; J. G. A. Meyer, 'Modern

BOILER SHOP TERMS

Locomotive Construction; Peabody and Miller, 'Notes on Steam Boilers'; R. H. Thurston, 'A Manual of Steam Boilers,' and 'Steam Boiler Explosions'; William Kent, 'Steam Boiler Economy'; W. H. Shock, 'Steam Boilers'; Leslie S. Robertson, 'Water Tube Boilers'; and W. H. Ford, 'Boiler Making.' See also the 1899 'Code' for boiler trials, in Vol. 20 of the 'Transactions of the American Society of Mechanical Engineers.'

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Boiler Shop Terms. The following list of terms includes the principal terms and phrases commonly employed in connection with the work of the design, construction, and use of steam boilers.

Specific information relative to boiler fittings such as valves and cocks may be found under the title **VALVES AND VALVE TERMS**.

Information relative to the design and construction of locomotive engine boilers, and concise descriptions of their various parts, fittings, and accessory appliances and devices such as pumps and injectors, and cocks, valves, and feed-water heaters, will be found carefully treated under the title **LOCOMOTIVE, DESIGN AND CONSTRUCTION OF THE MODERN**.

Special information relative to the general methods and operations of constructive work such as the boring, drilling, and punching of holes, and the joining of plates by riveting and welding, will be found under the title **WORK-SHOP TERMS**; while the definitions of the various terms and their abbreviations such H.P.—Horsepower, and B. T. U.—British Thermal Units, etc., may be found under the title **ENGINEERING AND STRUCTURAL TERMS** in this encyclopedia.

ACIDULATED WATER.—Water in which acids have been generated by the introduction of too much tallow into the boiler to prevent incrustation. Its use tends to produce boiler corrosion.

AIR CASING.—The enclosed space which envelops the uptake of marine boilers and prevents the loss of heat therefrom by radiation.

AIR SPACES.—The openings between the fire-bars of engine boilers.

ANTI-FOULING COMPOSITIONS.—See Incrustation.

ASH PIT.—That part of the furnace of a stationary boiler which lies below the fire-bars and immediately in front of the fire-door. It is provided for the reception of the ashes which fall through the bars, and constitutes the main draught entrance of the furnace.

BAFFLE PLATES OR BAFFLES.—The plates provided in the fire-boxes and flues of steam boilers for throwing the flames and hot gases against the best heating surfaces. Also to admit air above the fire, and to prevent the burning and buckling of the door of the furnace.

BALLOONING.—The process which takes place within a steam boiler when a sediment of fine mud and scale is carried to the surface of the water by the ebullition of the bubbles of steam. Large boilers are provided with "scum-troughs" for collecting this sediment.

BANDING OR BONDING.—The securing of the lagging around steam cylinders and boilers with broad encircling bands of sheet-brass or hoop-iron.

BAR-STAYS.—Solid screwed stays as distinguished from tube-stays or stay-tubes.

BEARING RING.—The ring which forms the support of the fire-bars in a vertical boiler.

BLAST.—The volume of air forced artificially into the furnaces of marine boilers to quicken the combustion.

BLEEDING.—The red streaks of rust which soak through the scale adhering to the inner surfaces of boilers and serve to indicate the presence of corrosion in the plates underneath.

BLISTERS.—Defects in boiler plates of poor quality, caused by the retention of cinders or sand therein during the rolling process.

BLOW-OFF OR BLOW-OFF COCK.—The pipe and cock situ-

ated at the lower part of the boiler by which the boiler is blown-off or emptied of its contents to prevent incrustation. In horizontal boilers of the Lancashire and Cornish type, a pipe called the blow-off bend connects the cock with the blow-off seating through which the boiler is blown-off into the ash pit.

BEAR OR BOILER BEAR.—See Punching Bear.

BOTTLE-TIGHT.—The seams, rivets, fittings, and mountings of a steam boiler are said to be bottle-tight when the joints are so close and perfect that there is not the slightest leakage through them under the application of the water or the steam tests.

BOTTLING-UP.—The temporary confinement of steam in the tubes of a sectional boiler caused by its being generated too rapidly.

BOWLING HOOP.—A ring of arch-shaped section, and provided with flanges for the reception of rivets, employed for uniting the sections of furnace shells in horizontal boilers.

BREAKING JOINT.—The manner in which the longitudinal seams of the plates of the boiler are arranged so as to act as supports for each other.

BRIDGE.—The barrier of brickwork built upon a girder-like casting which stretches across the fire-box of an engine boiler at the farther end of the grate. It serves to throw the flames upwards to the heating surface, and also prevents a too rapid escape of the heated gases.

BRINE PUMP.—A pump employed for periodically drawing off a certain amount of water from a marine boiler to prevent saturation.

BUNKER PLATE.—A sheet-iron plate which encloses the bunker or space which holds the coal or coke used in the furnace of an engine boiler.

BURSTING.—The destruction of a boiler by an excess of internal pressure, as distinguished from collapsing, or the failure of a boiler under the force of an external pressure.

CALORIMETER.—The sectional area of a boiler flue, given in square inches.

CAPACITY.—See Heating Surface.

CARBONATE OF LIME.—The principal substance which causes the incrustation of steam boilers and water-pipes. It is held in solution in the water as a bicarbonate by the excess of carbonic acid. When the boiler is heated the excess of acid is driven off, and the carbonate is precipitated in the form of a muddy deposit which hardens in the presence of heat into the form of an injurious scale.

CAULKING.—The process of burring or driving up the edges of boiler plates along the riveted seams to make them steam and water tight. The caulking of the joints between boiler shells and the flanges of cast-iron man-holes, and safety and stop valve seatings, is accomplished by means of caulking-strips or strips of sheet metal interposed between the wrought-iron of the shells and the cast-iron of the pieces attached thereto. This is rendered necessary on account of the impossibility of caulking the cast-iron.

CHIMNEY.—The tube or funnel through which the waste steam and smoke escapes from an engine or boiler into the open air. Its proportions bear a definite relation to the grate area, and vary in the different types of engines.

CIRCULATING TUBES.—The cross tubes of vertical boilers, or the ordinary forms of tubes used in multi-tubular boilers or surface condensers.

CIRCULATION.—The circulation in a steam boiler is caused by the bubbling up of the lighter boiling water from the heating surfaces through the heavier cooler water in the upper portions which descends and thus comes in contact with the heating surfaces. Efficient circulation is necessary to the rapid generation of steam, and for the prevention of incrustation. It is promoted by the use of properly arranged water tubes.

CLINKERING.—The removal of the clinkers or other vitrified material from the fire in the boiler, periodically.

CLOTHING.—The felt and wood coverings placed around boilers to prevent loss of heat by radiation.

COATING.—Non-conducting compositions of felt, silicate cotton, asbestos, etc., which are smeared or placed around steam boilers while the substances are in a plastic state, and which become subsequently hardened by the heat, and prevent the loss of heat from the boiler by radiation.

COLD WATER TEST.—The hydraulic test, for pressures only, applied to steam boilers, as distinguished from the hot water test.

COLLAPSE.—The destruction of the tubes and fire-boxes of steam boilers by external pressures which cause them to fail by bending or crumpling inwardly.

COLLECTOR.—A cylindrical vessel enclosed in a steam boiler for the purpose of collecting the sedimentary matter contained in the water, which if allowed to

BOILER SHOP TERMS

- remain in the water would produce injurious scale and incrustation. The material thus collected is removed by being blown-out at intervals.
- COMBINED STEAM.**—Dry and wet steam allowed to mingle together before being used. Its use, at a temperature not exceeding 310° Fahr., tends to diminish the evils of corrosion and priming.
- COMBUSTION CHAMBER.**—That portion of a boiler flue in which the gases liberated by the action of the fire are burned. It lies between the grate and the smoke-flue.
- CORROSION.**—The rusting or oxidation of metals by contact and chemical union with oxygen in the presence of water. Boiler corrosion is either internal or external. Internal corrosion is due to the presence of acidulated water, or to superheated steam in the steam-chamber. External corrosion results from leakage and from contact with damp foundations and seatings.
- CORRUGATED FURNACE TUBES.**—Furnace tubes which are ribbed in their longitudinal sections. They are extensively used both in land and marine boilers. The elastic character of the corrugations absorbs the linear expansion of the tubes under the influence of heat, and thus prevents the strains which tend to bulge the end-plates of the boiler.
- CROSS-TUBES.**—The heating tubes in a vertical or cross-tube boiler. They pass through the fire-box, and therefore, being surrounded by the fire, materially assist in maintaining a rapid circulation of the water. They are cleaned through a mud-door placed opposite the end of each tube.
- CROWN.**—The boiler crown proper, is the uppermost plate in the shell of the boiler. It is formed either in the shape of a hollow disc flanged around the edges, and by which it is riveted to the outer shell-plates, or it is made flat and secured in place by means of stays. That portion of the crown which lies over the top of the furnace or inner shell is usually designated as the fire-box crown.
- DAMPER.**—The plate, cover, or valve, employed for regulating the amount of draught in a boiler or furnace flue. The contrivance is usually balanced with a weight called the damper-weight which assists in its adjustment.
- DEAD-PLATE.**—The cast-iron plate which lies immediately within the furnace door of an engine boiler. It is provided for the reception, and for the partial coking of the coal before it is passed forwards onto the grate.
- DEAD-WATER.**—The water which lies below the heating surface of the boiler, and, therefore, is in comparatively slow circulation. In some forms of boilers the flues are brought forwards under the bottom so as to heat the dead water and thus induce a more rapid circulation therein.
- DOLLY.**—A riveting tool used by boilermakers for holding under the heads of rivets during the act of riveting.
- DOUBLE-ENDED BOILER.**—A marine boiler provided with furnaces and flue doors at each end, and is therefore fired from each end.
- DRY STEAM OR SATURATED STEAM.**—Steam which has not been superheated, nor mixed with the water of priming. It is the most suitable form of steam for use in engine cylinders.
- ECONOMIZER.**—An arrangement of pipes by means of which the feed-water for steam boilers is heated up to, or higher than, the boiling point.
- EVAPORATIVE VALUE.**—The relative capacities of the various types of steam boilers to vaporize water, expressed in horse-powers, units of work, or in thermal units.
- EXPANDING.**—The tightening of boiler tubes in the tube plates by expanding or opening out their ends.
- EXPANSION HOOP.**—The metal ring which is used in the forming of an expansion joint provided in long boiler flues for the purpose of taking up the linear expansion due to heat.
- FEDDER.**—The agency by which the feed-water supply of a boiler is maintained. Usually, it is some form of force pump, or an injector.
- FIRE-BARS.**—The grate-bars of the furnaces of engine and other boilers.
- FIRE-BOX.**—A term which is specifically applied to the furnaces of locomotive and vertical boilers.
- FIRING.**—Boilers are fired both internally and externally. Internally fired boilers are those in which the fuel is consumed in a tube or arrangement of tubes within the boiler itself. The Cornish with one flue, the Lancashire with two flues, the locomotive boiler and other forms of boilers with many internal tubes, the vertical boilers with uptake and cross-tubes, and the marine boilers with return flues are of the internally fired class. Externally fired boilers are those which are not provided with internal fire-boxes or furnace flues. The egg-end, the balloon, the hay-stack, and the wagon boilers are of this class. They are practically obsolete.
- FIRE TUBE BOILER.**—A multitubular boiler, as distinguished from a sectional boiler or a water tube boiler.
- FITTINGS.**—The fittings of a boiler comprise the man-hole and mudhole doors, the fire-bars and their rings and bearers, the furnace doors, the dampers and frames, etc.
- FLAME PLATES.**—The crown plates of a boiler flue or fire-box.
- FLANGING.**—The bending over of the edges of the boiler plates so as to form narrow flanges by which they are attached to each other either by riveting or by welding.
- FLOAT.**—A buoy employed to indicate the height of the water in the boiler. It is usually made of stone or of iron, and is rendered buoyant by means of a counterpoise the proportion of which relatively to the specific gravity of the float renders the float quite as susceptible to the variations in the water level as a float of wood. Its movements are observed by means of the float gauge attached to the boiler.
- FLASH BOILER.**—A steam boiler composed of a large number of small tubes which are kept red-hot, and unto which the water is fed in the form of a spray which is instantly converted into steam. They are principally used in connection with steam driven automobiles.
- FLUES.**—The flues of a boiler are the arrangements or parts which carry off the waste gases and smoke, and produce the draught.
- FLUE PLATES.**—The ends of horizontal boilers to which the flues are attached, or the fire-box crowns of vertical boilers.
- FLUE SURFACE.**—The area of the flues as distinguished from the grate-area.
- FOLLOWING JOINTS.**—The lap joints of the rings which compose a cylindrical boiler. As all of the joints lap in the same direction, they are called following joints.
- FULLERING.**—A mode of caulking boiler plates. It differs from caulking proper in that the entire edge of the plate is hammered over instead of only a portion of the edge.
- GRATE.**—The area which contains the burning fuel in the furnace of an engine boiler. The grate-area is the number of square feet covered by the grate-bars or fire-bars which compose the grate. It is equal to the area over which full combustion can take place, and is usually estimated in relation to the weight of coal burned.
- GROOVING OR FURROWING.**—The cutting or corroding which takes place in the seams of improperly stayed boiler plates. It is partly due to the leverage to which those parts are subjected, and partly to the action of acids in the lines of strain.
- GROSS SECTION.**—The total number of inches contained in the circumference of a steam boiler.
- GUSSET OR GUSSET STAY.**—A triangular piece of wrought-iron or steel employed to support the flat ends of boilers. Large boilers are provided with five gusset stays at each end, which are secured to the end-plates and the shell by angle-irons.
- HOLES.**—When the rivet holes in boiler plates are punched or drilled so inaccurately that they do not coincide within an amount equal to one-half their diameters when the plates are brought together, they are called half-lap or half-blind holes. When the holes do not correspond within the extent of a whole diameter they are called blind-holes. In riveting, such holes are either pulled together with a drift, or they are reamed out and larger rivets inserted.
- HAND HOLES.**—Holes provided in the shells of steam boilers in cases where a mudhole is impracticable, through which the hand may be introduced for purposes of cleaning and repair.
- HARD WATER.**—Water which contains a large percentage of carbonate and sulphate of lime. Its tendency to produce calcareous deposits makes it very objectionable for use in steam boilers.
- HEATING SURFACE.**—The entire surface of a steam boiler, comprising the surfaces exposed to the heat on one side and the surfaces in contact with the water on the other side.
- HOGGING.**—The distortion of the furnace tubes of boilers caused by the expansion of the plates under the influence of heat.
- HONEYCOMBING.**—A form of boiler corrosion consisting of numerous blank holes or pits. It is due to the action of acids, to galvanic action, or to a lack of uniformity in the quality of the plates.
- HORIZONTAL BOILER.**—One in which the longitudinal axis of the barrel is horizontal, such as the Cornish, Galloway, and Lancashire boilers, and various forms of marine boilers.

BOILER SHOP TERMS

- INCLINATION.**—Some forms of horizontal boilers are inclined forwards about half an inch per ten feet of length so as to drain properly through the blow-off cock. Fire-bars are inclined backwards about one inch in ten inches to permit of the fuel being moved rapidly away from the dead-plate.
- INCrustation.**—Coatings of carbonate and sulphate of lime and other solids formed on the internal portions of engine boilers by deposition from the feed water.
- INJECTION.**—The process of drawing water into a steam boiler by means of an injector.
- KERLSONS.**—The wrought-iron or steel saddles which support marine boilers.
- LAMINATED PLATES.**—Wrought-iron or rolled steel plates in which the several layers are imperfectly united. They are very apt to blister when used for boiler plates.
- LEAKAGE.**—The loss of feed water due to the alternate expansion and contraction of the plates under the influence of sudden heatings and coolings, which tend to start the rivets and open the seams.
- LONGITUDINAL SEAMS.**—The plates which run lengthways of the boiler. They are always arranged to break-joint, and are never placed in-line.
- MANHOLE.**—An opening provided in the shell of the boiler through which a man may gain access to the interior for purposes of examination, cleaning, and repair. It is oval in form and is usually stayed either with a wrought-iron ring, or with a casting.
- MARINE BOILER.**—A horizontal boiler of the return tubular type. They are of many different types, and vary in their arrangement to suit different conditions.
- MUDHOLE.**—An opening in the lower part of a boiler through which the sediment deposited by the water is removed. When the boiler is being used, the mud-hole is closed by a door called the mud-lid which is inserted within the hole and pulled up against its inner face by means of a bolt. This bolt is attached to the door and passes through a bridge which spans the hole and rests against its outer face. The bolt is tightened to the bridge by means of an ordinary nut.
- MULTITUBULAR BOILER.**—A boiler composed of numerous tubes of brass or of iron, through which the hot gases pass from the fire-box to the chimney, and thus heat the water which is in contact with the outer surfaces of the tubes. The locomotive, horizontal, and portable boilers are of this type.
- OVERHEATING.**—The overheating of boiler parts are due either to incrustation, or to an insufficient supply of water. It tends to soften the plates so that they bulge or fracture under the force of internal pressures.
- OVERPRESSURE.**—The pressure developed in a steam boiler exceeding that which it is designed to sustain.
- PATCH.**—A strengthening plate of wrought-iron or steel riveted or bolted to the boiler plates which have been injured by accident, or have become weakened by corrosion.
- PITTING.**—The corrosion of boiler plates in patches. See Honeycombing.
- PLATE.**—In the manufacture of steam boilers the use of wrought-iron plates has been completely abandoned for those of steel. The steel plates are rolled in larger sizes, thus reducing the number of riveted seams, and as they possess a much greater tensile strength, they permit of the development of the higher pressures required by modern engines.
- PLATE FURNACE.**—A reverberatory furnace used by boiler-makers for heating plates preparatory to bending, flanging, and welding.
- PRESSURE.**—The working pressures in steam boilers vary with the type of the boiler, the material of the boiler plates, and the method of construction. They range from 45 to 60 pounds per square inch in those of the Cornish and Lancashire type; from 100 to 180 pounds in the marine boilers; and from 120 to 235 pounds in the portable and locomotive boilers.
- PUNCHING BEAR or BOILER BEAR.**—A portable punching machine. The punch is actuated either by a screw, or by hydraulic pressure.
- RETURN FLUES.**—The flues in horizontal boilers, which are brought from the back of the furnace to the front, and are then carried back again to the chimney.
- RETURN TUBULAR BOILER.**—A marine boiler in which the smoke tubes extend from the back of the boiler forwards to the smoke-box. By this arrangement, the products of combustion are carried first to the back of the boiler through the fire-box, and then to the front of the boiler through the tubes.
- RIBBED TUBES.**—Tubes which are rolled so as to form several deep radial ribs on their internal surfaces, and thus increase the area of the available heating surface. They were invented by M. Serve. The Purves tubes are ribbed or corrugated transversely. The use of these tubes gives from 15 to 20 per cent. better results relative to the economical consumption of fuel and the increase in steam pressure than may be obtained by the use of the ordinary tubes with smooth surfaces.
- RINGS.**—Metal rings used for uniting the shells and fire-boxes, for the jointing and caulking of seams, and other similar purposes. They are either cast or welded.
- RING SEAMS.**—The circumferential joints of a boiler shell.
- SALINOMETER.**—An instrument employed for ascertaining the amount of salt in the feed-water of a marine boiler. It is either a hydrometer graduated for degrees of saltiness, and by which the specific gravity of the water is measured, or a thermometer by which the boiling point of the water is determined, and the percentage of salt in solution deduced therefrom.
- SALTING.**—The deposits of salt which accumulate on the plates of a marine boiler. It is not injurious to the plates unless excessive in quantity. The density of the feed-water should not exceed ten ounces of salt per gallon.
- SATURATED STEAM.**—Steam which remains in contact with the water from which it has been generated, and therefore retains a quantity of water in suspension. Also called Dry Steam.
- SCALING.**—The process of removing the scale or deposits of carbonate of lime, etc., from the interior of boiler plates. It is effected by a process of chipping with a keen-edged hammer called a scaling-hammer.
- SECTIONAL BOILER.**—A boiler composed of a number of small independent heating tubes. The advantages of sectional boilers are the high pressures that may be developed in them, the strength of the small tubes, the prevention of explosions, the rapid transmission of heat, and the facility with which local injuries may be repaired. Their disadvantages consist in the tendency to accumulate deposits in the flues, the tendency to overheating, and the difficulty experienced in clearing them out.
- SCUM COCK.**—A cock inserted in the side of a marine boiler for discharging the dirt and scum carried to the surface of the water, and which if allowed to remain in the water would deposit and form an injurious scale. See Ballooning.
- SOOT DOOR.**—A square iron door built into the front ends of the brickwork flues of horizontal boilers, through which the accumulations of soot are removed periodically.
- STAYS.**—Rods or tubes which connect and stay the flat ends of the boiler. They are made either of copper, wrought-iron, or steel. Bar stays and tube stays, also called screwed stays, are first screwed into the ends of the shells or fire-boxes, and then secured either with nuts or by riveting. Gusset stays are riveted.
- STEAM ROOM.**—The area included between the highest water level in the boiler and the boiler crown. It is the space occupied by the steam.
- TESTING.**—The strength of steam boilers or their capacity to withstand the stresses due to internal steam pressures are usually ascertained by the application of a pressure of water produced by means of a test pump. The pressure usually applied under test is about twice the working pressure.
- THROUGH TUBES.**—The flue tubes of horizontal boilers. They pass from one end of the boiler to the other, and are attached to the end plates.
- TIE BOLTS.**—Long screw bolts employed for the purpose of staying large, flat surfaces, which are inherently weak.
- TRANSFER OF HEAT.**—The transmission of heat from the furnace of a boiler to the water in the boiler. The rate of transmission or the number of heat units transferred per hour, varies according to the amount of heating surface, and is directly proportional to the thickness of the plates. Furnace area is more efficient than tube area.
- TUBE PLATES.**—The plates into which the tubes of multitubular boilers or surface condensers are inserted and secured.
- TUBULAR BOILER.**—Various forms of locomotive, marine, portable, horizontal, vertical, and sectional boilers.
- UPTAKE.**—In a vertical boiler, it is the internal flue which leads from the furnace to the chimney. In a marine boiler, it is the return flue.
- VENT.**—The value obtained by multiplying the calorimeter of a boiler by its length.
- VERTICAL BOILER.**—A steam boiler of circular horizontal section. Vertical boilers are chiefly used in connection with small steam engines, and are not

BOILING POINT—BOIS DE BOULOGNE

nearly as economical as those of the horizontal type, as the products of combustion pass from the fire-box directly into the chimney.

WATER BRIDGE.—A form of bridge which is made of iron and is continuous with the boiler itself. It is hollow, and therefore assists the circulation of the water which passes through the interior of the boiler.

WATER TUBE BOILER.—Various forms of sectional boilers of the Yarrow, Thornycroft, Babcock and Wilcox, Belleville, and other classes.

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Boiling Point, the temperature at which a liquid boils, when exposed to a definite pressure, which is understood to be the ordinary atmospheric pressure, in the absence of any specific statement to the contrary. When a liquid is freely exposed to the air, evaporation goes on constantly from its surface, the heat required being absorbed from surrounding bodies. If the liquid is warmed, the evaporation goes on at an increased rate; but as its temperature is increased by the application of heat, there comes a time when mere superficial evaporation cannot take care of all the heat supplied. Bubbles of vapor then form within the body of the liquid, and the liquid is said to have attained its "boiling point." If the supply of heat be now increased, it is found that the temperature of the liquid remains stationary; bubbles merely form more rapidly, so that the rate of loss of heat through evaporation is still maintained equal to the rate of supply. The temperature of boiling depends upon the pressure; for at an increased pressure the bubbles are formed in the interior of the liquid with greater difficulty, and therefore not until a higher temperature is attained. The variation from this cause is considerable. Thus the boiling point of water, under a pressure of one atmosphere, is 212° F., while under a pressure of two atmospheres it is about 250° F. At the reduced pressures prevailing on the tops of mountains, the boiling point of water is lower than 212° F., and advantage of this fact is taken for determining the heights of mountains by observations of the boiling point at their summits. (See **HYPSOMETRY**.) When the liquid is not open freely to the air, but confined in a closed vessel, its temperature can be raised indefinitely by the application of heat, but the vapor in the space above it is denser, and has a greater pressure, at higher temperatures. The correspondence between pressure and temperature, under these circumstances, is very exact, although no simple law connecting the two is known. Rankine gave an empirical formula for the relation between them, of which computers of steam tables have made great use ('Miscellaneous Scientific Papers,' page 1); but the physical significance of this formula is unknown. The relation between the pressure and boiling point of a liquid is commonly exhibited by means of a table in which the temperatures of ebullition are set down opposite the corresponding pressures. (For a table of this sort for water, see **STREAM**.) The phenomena described above in connection with the free evaporation from a liquid exposed to the air are in general true, but certain qualifications must be made, under certain special conditions. Thus, it is difficult to induce water to boil when it has been freed from dissolved air; and in the entire absence of such air De Luc found that water can be heated as high as 234° F., under ordinary

atmospheric pressure, before boiling, if the experiment is performed with proper care. A liquid thus heated to a temperature in excess of the normal boiling point corresponding to the pressure to which it is subjected is said to be "superheated." When boiling does finally occur in a superheated liquid, it takes place with almost explosive suddenness, and the loss of vapor is exceedingly rapid for a moment or two, until the temperature of the liquid has been reduced by this means to the normal temperature corresponding to the pressure prevailing at the time. The temperature at which ebullition takes place is also influenced to a certain extent by the nature of the vessel in which the liquid is heated. Thus Marcet found that in a glass vessel which had been carefully washed out with sulphuric acid, and then well rinsed, pure water does not boil until a temperature of 223° F. has been attained. All results of this kind are of an indefinite character, however, since they relate to the temperature at which boiling first begins, rather than to the state in which the liquid and its vapor are in a condition of permanent thermal and mechanical equilibrium. Superheated water is in an unstable state, and, according to some authorities, not a few boiler explosions have been due to the superheating of the water present, from some cause, and the subsequent explosive liberation of steam, as the water returned to its normal condition; but this notion concerning the cause of boiler explosions has never been substantiated by experiment or otherwise, and must be regarded as a mere speculation, without any foundation in fact. A liquid has a higher boiling point, when it contains some substance in solution, than it has when pure. The effect of dissolving salt or any other electrolyte is complicated by the occurrence of dissociation (q.v.); but for dilute solutions of non-electrolytes, like sugar, the following law, first given by Raoult, holds true: If a series of dilute solutions of such substances be prepared, each solution containing, per unit weight of the solvent, an amount of solid proportional to the molecular weight of the solid, then the solutions so prepared will all boil at the same temperature. (See **SOLUTIONS**.) For marking the "boiling point" upon thermometers, it is the universal practice to expose the thermometers to the steam rising from the boiling water, rather than to immerse them in the water itself; for the temperature of the steam is independent of the presence of traces of dissolved substances in the water, and also of the action of such accidental or irregular causes as the superheating of the water. See **THERMOMETRY**.

Boilly, Louis Leopold, loo-ē lā-ō-pōld bwā'ye, French painter: b. La Bassée, France; d. 1845. To his prolific brush are attributed about 5,000 paintings, chiefly historical. The period represented on his canvases ranges from the time of Louis XVI. to the end of the Restoration. Among his works are: 'Arrival of the Diligence' (1803); and 'Isabey's Atelier.'

Bois d'Arc, bwā-dārk, the osage orange (q.v.).

Bois de Boulogne, bwā-dē boo-lō-ny, once a forest abounding with game near the gates of Paris, now a beautiful park belonging to the city; area, 2,250 acres. The greater part of the old trees were destroyed during the revolution. When Napoleon chose St. Cloud for a summer

residence, he ordered young trees to be planted, had the place enclosed with a wall, and stocked with game. In 1815 the British troops under the Duke of Wellington were stationed in it, and many of the trees were then cut down, but new ones were planted by Louis XVIII. In 1852 it came into the possession of the municipality, and is now one of the gayest holiday promenades. During the Franco-German war of 1870-1 a large number of the trees were cut down by the French in preparing for the defense of Paris. In the time of the disturbances of the Commune in 1871 several sanguinary encounters took place here. In the Bois are the noted Auteuil and Longchamp race courses, and also the Jardin d'Acclimatation.

Bois-le-Duc, bwā-lê-dük (Dutch *HERTOGENBOSCH*), the capital of the province of North Brabant, in Holland, 49 miles southeast of Amsterdam, at the confluence of the Dommel and the Aa, which form, by their junction, the Diest. It was a strong fortress up to 1876, but has ceased to be kept as such. It is intersected by canals, and among its buildings the chief is the cathedral, in late Gothic, built in 1458-98, with an old tower of the 11th century, and a chapel of the 13th, the whole recently restored. Other buildings are the town-hall, palace of justice or court-house, the episcopal palace, and the government buildings. Among educational institutions are a gymnasium, a Latin school, and a normal school for teachers. Bois-le-Duc has many industrial establishments and an active trade. Its chief manufactures are gold and silver wares, cigars, mirrors, boots, and shoes, etc. The city suffered much in the religious wars of the 16th century, and fell into the hands of the Dutch in 1629. On 14 Sept. 1794, the French defeated the English here, and on 9 October of the same year it surrendered to Pichegru. In January 1814, it was taken by the Prussians, but the citadel held out.

Bois-Guilbert, bwā-gel-bār, Sir Brian, a character in Scott's 'Ivanhoe.' He is a Knight Templar whose passionate attachment to the beautiful Jewess Rebecca, severe struggle with his pride and tragical death in the lists, form one of the most dramatic features of the romance.

Bois de Vincennes, bwā dé vān-sēn, the ancient hunting park of Louis IX.; now a pleasure-ground of 2,250 acres on the west of Paris. A large portion of it is devoted to the purposes of the Champ de Manœuvres, drill-ground, and polygone d'artillerie.

Boise, James Robinson, American educator: b. Blandford, Mass., 27 Jan. 1815; d. Chicago, 9 Feb. 1895. He was graduated at Brown in 1840, and received an appointment there as tutor in ancient languages. In 1850 he went abroad to study; in 1852 became professor of the Greek language and literature in the University of Michigan; in 1868 took the same chair in the University of Chicago. Upon the establishment of the new University of Chicago, he was appointed professor emeritus of New Testament Greek. The numerous classical text-books edited by him were widely used. Besides these, he published: 'Notes on the Greek Text of Paul's Epistles to the Ephesians, Colossians, Philemon, and the Philippians' (1884); 'Notes on the Greek Text of Galatians and Romans' (1886).

Boise, Otis Bardwell, American composer and music teacher: b. Oberlin, Ohio, 13 Aug. 1844. After studying music in Leipsic he settled in New York as a teacher of composition and for a time was organist of the Fifth Avenue Presbyterian Church. During 1876-7 he was again in Europe studying and had the benefit of Franz Liszt's advice and criticism, after which he resumed teaching in New York. Since 1888 he has been engaged in professional work in Berlin. He has published: 'Harmony Made Practical' (1900); 'Music and Its Masters' (1901), and many articles in journals devoted to music.

Boise, Idaho, the capital of the State and county-seat of Ada County; on the Boise River and the Union P. R.R.; 45 miles southwest of Idaho City. It occupies the site of a former trading post of the Hudson Bay Company; is in an agricultural and a rich mining region; and is supplied with pure hot water from a flowing boiling well. The city is said to be the only one in the world having a natural supply of hot water. It contains the State capitol, erected in 1885-7, penitentiary, United States assay office, State library, high and graded schools, and two national banks. Its mayor is elected biennially. Pop. (1910) 17,358.

Boisgobey, Fortuné Abraham du, fôr-tū-nā äb-rā-ham dü bwā-gō-bā, French novelist: b. Granville, 11 Sept. 1821; d. February 1891. In 1844-8 he was paymaster in the army at Algiers, and began to write in 1868, somewhat on the lines of Emile Gaboriau. His novels were popular, and include: 'The Scoundrels' (Paris 1873); 'Chevalier Casse-Con' (1873); 'The Mysteries of Modern Paris' (1876); 'The Demi-Monde Under the Terror' (1877); 'The Old Age of M. Lecoq' (1878); 'The Cat's Eye' (1888); and 'The Cold Hand' (1879).

Boisserée (bwā-srā) Collection, a number of pictures exhibited in Munich, which were collected by the brothers Sulpice (1783-1854) and Melchior Boisserée (1786-1851), and John Bertram, men who, animated by love of the arts, began, at the time of the destruction of the monasteries, during and after the French revolution, to purchase old pictures, and afterward completed their collection by the addition of many valuable paintings of the old German school. By this collection the brothers Boisserée and Bertram happily realized the idea of a historical series of old German paintings. It is to their endeavors that we owe the discovery that Germany possessed, as early as the 13th century, a school of painters of much merit, which, like the Italian, proceeded from the old Byzantine school, but became, in the sequel, distinguished by excellences of its own. We owe to these collectors, also, the restoration to favor of the forgotten Low German masters, and a just estimation of John van Eyck, as the creator of the genuine German style of painting. The most distinguished connoisseurs and artists, including Goethe, Canova, Dannecker, and Thorwaldsen, have strongly expressed their admiration of this collection. It was first brought together and exhibited at Heidelberg, and afterward removed to Stuttgart, where the king of Württemberg assigned it a suitable building. The collection remained there till 1828, when King Louis of Bavaria, having purchased it in the previous year for 120,000 thalers, removed

it to Schleissheim, and in 1836 most of the paintings were sent to Munich. A lithographic work on this collection was published in 40 parts between 1821 and 1840. See 'Sulpiz Boisserée,' a biography (1862).

Boissier, Marie Louis Gaston, mā-rē loo-ē gās-tôn bwā-syā, French archaeologist and historian: b. Nîmes, 15 Aug. 1823; d. 10 June 1908. After studying at the Ecole Normale he taught rhetoric in Nîmes 1847-57; professor of Latin eloquence and literature at the Collège de France from 1861, was elected to the French Academy in 1876 and to the Academy of Inscriptions and Belles-lettres 1886. His literary style was much praised for its clearness and beauty. His works comprise 'Le poète Attius' (1857); 'Etude sur la ire et les ouvrages de Terentius Varron' (1861); 'La religion romaine d'Auguste aux Antonins' (1883); 'La fin du paganisme' (1894); 'Cicéron et ses amis' (1892); and 'Promenades archéologiques Rome et Pompéi' (1892); the two last named being marvelously accurate and vivid reconstructions of the antique spirit and atmosphere. Other works are: 'Roman Africa,' and 'The Country of Horace and Vergil.'

Boissieu, Jean Jacques de, zhôn zhāk bwā-syē, French painter and engraver: b. Lyons, 1738; d. there in 1810. He was intended by his parents for the magistracy, but manifested such a decided inclination for drawing that he was allowed to follow it. After remaining for some time at Lyons, and painting some excellent imitations of the Flemish school, he visited Paris, where his intimacy with the most celebrated artists of the time enabled him greatly to improve his style. On his return to Lyons he devoted his attention chiefly to engraving. He afterward accompanied the Duc de Rochefoucauld to Italy, and having studied the works of the great masters with the greatest assiduity, resumed painting; but as the use of oil injured his health, he, shortly after his return to France, abandoned it finally for engraving, in which his reputation soon became European, and his works were eagerly purchased by the most wealthy and distinguished amateurs. His engravings amount to 140 plates, among which that of 'Le Charlatan,' after a picture by Karel Du-jardin, is considered his masterpiece.

Boissonade, Jean François, zhôn frân-swā bwā-sō-nād, French classical scholar: b. Paris, 12 Aug. 1774; d. Passy, 8 Sept. 1857. He was educated at the Collège d'Harcourt, and at the age of 18 was attached to the ministry of foreign affairs. He subsequently became a contributor to periodical literature in the 'Magasin Encyclopédique' of Millin and the 'Journal de l'Empire,' the precursor of the 'Journal des Débats.' Ancient and modern literature, both French and foreign, grammatical criticism, bibliography, and natural sciences occupied his pen. In 1813 he was admitted a member of the Academy of Inscriptions and Belles-Lettres. He afterward wrote about 150 articles for the 'Bibliographie Universelle.' He became, in 1809, assistant of Larcher, as Greek professor of the faculty of letters in Paris, and four years afterward he succeeded him both in the faculty and in the institute. Finally, in 1828, he was called to the chair of Greek literature in the College of France. From this time he devoted himself entirely to his duties as a professor, and his

labors as a classical editor. He has produced no complete work in French, but is said to have written Latin with natural grace and elegance, and his editions of the classics are highly esteemed. His editorial labors were also extended to a few French works, and he translated a heroï-comic poem, the 'Genpillon,' from the Portuguese.

Boissy d'Anglas, François Antoine, frân-swā ân-twân bwā-sē dān-glas (COMTE DE), French statesman of the revolutionary period: b. Saint Jean-la-Chambre, near Annonay, 1756; d. Paris, 20 Oct. 1826. He studied at Annonay, and was admitted as an advocate to the parliament of Paris. In 1789 he was elected to the States-General where he was a moderate advocate of revolutionary principles, in support of which he wrote at this time various brochures. In 1792 he was returned as a deputy to the convention. He voted against the death of Louis XVI, and after the fall of Robespierre he was appointed secretary of the convention, and a member of the Committee of Public Safety. He was created a peer by Louis XVIII. in 1814, but supported Napoleon during the Hundred Days, and was consequently expelled from the peerage by a royal ordinance, but shortly afterward reinstated. He was from 1803 a member of the consistory of the Reformed Church, a member of the Institute from its commencement, and on its reconstruction in 1816 he became a member of the Academy of Inscriptions. He wrote an essay on the life and writings of Malesherbes (1819-21); 'Etudes Littéraires et Poétiques d'un Vieillard' (1825).

The fame of Boissy d'Anglas rests chiefly on a scene in the convention in 1795, when the hall was invaded by an angry mob demanding bread and the Constitution of 1793. Called temporarily to take the chair, in the absence of the president, Boissy had presented to him the head of a deputy, Féraud, which had been cut off by the insurgents and placed on the end of a pike. He saluted it, and continued calmly facing the mob, and to his courage and firmness the safety of the convention at this crisis is attributed. Such is the popular version of a story of which the most various and contradictory accounts are given. It has been said that Boissy d'Anglas exhibited no such courage as has been attributed to him, and that he was merely kept in his place by the pressure of the mob. His enemies, who accused him of reactionary tendencies, even said the insurrection was started by the reactionary party to discredit the revolution, and that Boissy was in understanding with the leaders of the mob. For this last accusation there appears to be no foundation, but it is quite likely the scene may have been represented in a more dramatic form than as it actually occurred.

Boito, Arrigo, ā-rē'gō bō-ē'tō, Italian composer: b. Padua, 24 Feb. 1842. His great work, the opera 'Mefistofele,' occupied him for nearly 20 years. The garden scene was written while he was a student in the Milan Conservatory in 1856, and the score was finished for the stage in 1868, the composer having done much literary work in the interim and lived variously in France, Germany, and Poland. On 5 March 1868, 'Mefistofele' was sung at La Scala, Milan, the performance lasting six hours, much interrupted by hissing and applause, and its failure was evident. Boito then remodeled the opera,

and in 1875 it was produced at Bologna with great success. It was sung in other cities with equal success, but it has never been a popular opera in the full sense of the word. In 1883 it was produced at the New York Metropolitan Opera House with Campanini and Nilsson in the cast and was revived in 1896 and again in 1901. The opera is considered one of the most important of modern Italian operas, marking, as it does, the precise point where the modern school of Italian composition, illustrated by the later works of Verdi, Mascagni, Puccini, etc., diverges from the work of the Bellini and Donizetti school. Boito's other operas, 'Ero e Leandro'; 'Nerone'; and 'Orestide' have never been sung.

Boivin, Marie Anne Victoire, mā-rē ān vīc-twār bwā-vān (GILLAIN), French midwife, upon whom a diploma of M.D. was conferred by the University of Marburg, noted for her writings on obstetrics: b. Montreuil, 9 April 1773; d. 16 May 1841. She was educated in a nunnery, where by her talents she attracted the attention of the sister of Louis XVI., Madame Elisabeth. When the nunnery where she was placed was destroyed in the course of the revolution, she spent three years in the study of anatomy and midwifery. In 1797 she married an employee at Versailles, of the name of Boivin, but on being left after a short time a widow with a child and without fortune, undertook the office of midwife at the Hospital of the Maternity, and, in 1801, was appointed chief superintendent of the institution, to which, in accordance with her suggestion, a special school of accouchement was added by Chaptal. Her 'Mémorial de l'art des accouchements,' published in 1824, passed through several editions. The empress of Russia invited her to St. Petersburg, but she declined.

Bojaca, bō-zhā'kə, Battle of, so called from having been fought near the bridge of the small town of Bojaca, not far from the city of Tunja, between the Spaniards under Barreyro, and the united forces of Venezuela and New Granada, commanded by Bolivar. It occurred 7 Aug. 1819, and was decisive of the independence of New Granada. Among the Republicans, Gens. Anzuategui, Paez, and Santander distinguished themselves; and the Spaniards sustained a total defeat, their general, most of their officers and men who survived the battle, together with all their arms, ammunition, and equipments, falling into the hands of Bolivar. So complete was the destruction of the Spanish army, that the viceroy instantly fled from Santa Fé, leaving even the public treasure a prey to the conquerors.

Bojador, bō-zhā-dōr', Cape, a promontory on the west coast of Africa; lat. 26° 7' 10" N.; lon. 14° 29' W. It is one of the projecting points of the great desert of Sahara, and forms the west extremity of a rocky ridge called the Jebel-khal or Black Mountain. The coast north of this cape is extremely dangerous, being shallow to a great distance out, and constantly enveloped in a haze. It has been, in consequence, the scene of many a melancholy disaster. Cape Bojador was long the limit of navigation toward the south and was first passed by the Portuguese in 1433.

Bojol', Philippines, an island north of Mindanao, about 40 miles long by 30 miles wide. It is woody and mountainous. Rice and gold are its chief productions. Pop. 187,000.

Bok, Edward William, American editor: b. Helder, Holland, 9 Oct. 1863. He came to the United States in infancy, and was educated in the public schools of Brooklyn. He has edited the 'Ladies' Home Journal,' and written 'The Young Man in Business,' and 'Successward.'

Boker, George Henry, American poet and dramatist: b. Philadelphia, Pa., 6 Oct. 1823; d. there, 2 Jan. 1890. He graduated from Princeton in 1842; studied law; and was United States minister to Turkey in 1871-5, and to Russia in 1875-9. His plays include: 'Calaynos' (1848); 'Anne Boleyn' (1850); 'Francesca da Rimini'; 'The Betrothed'; and 'All the World's a Mask.' He published also 'Poems of the War' (1864); 'Königsmark and other Poems' (1869); 'The Book of the Dead' (1882); and 'Sonnets' (1886); 'Francesca' is his best play and has been several times put upon the stage by Barrett and other actors.

Bokelmann, Christian Ludwig, krīst-yān lood-vīg bō'kēl-mān, German painter: b. Saint Jürgen, 1844; d. 1894. He was a pupil of Wilhelm Sohn at Düsseldorf and became distinguished as a genre and portrait painter. Among his works are: 'House of Sorrow'; 'Pawnbroker's Shop'; 'Opening of the Will'; 'Portrait of Klaus Groths.'

Bokhara, bō-kā'ra, a khanate of Central Asia, practically vassal to Russia, bounded on the north by Russian Turkestan, west by Khiva and the Russian Trans-Caspian territory, south by Afghanistan, and east by Russian Turkestan. It formerly occupied considerably more territory than now, having been reduced by the conquests and encroachments of Russia, which have been only partially compensated by some additions. The present area of the khanate is estimated at about 92,000 square miles. The country is to a great extent occupied by deserts and low and naked ranges of mountains, and the cultivated portions of it are confined to the valley of the rivers, especially the Oxus or Amoo Daria, which forms the southern boundary for a considerable distance, and then flows from southeast to northwest parallel to and not far from the frontier of the country. Bokhara lies between lat. 37° and 41° N., and in greater part is no more than 1,100 or 1,200 feet above the level of the sea, but in the extreme east is mountainous. The climate is subject to great extremes, being warm in summer and very cold in winter. There is very little rain, on which account it is necessary to resort to artificial irrigation. Besides cereals, cotton, tobacco, and vegetables are cultivated, and there is abundance of fruit. The total population amounts to about 2,250,000, and consists of the Uzbecks, who are the ruling race, and to whom the emir belongs; the Tajiks, who form the majority in the capital; the Kirghizes, less numerous than the Tajiks; about 60,000 Arabians, descendants of the soldiers who were brought into the country by the third caliph of Bagdad on the occasion of the conquest of Turkestan; Persians who have chiefly been brought as slaves to Bokhara; Turcomans, Hindus, and about 10,000 Jews who live in the towns beyond the protection of the law, and accordingly oppressed by the other inhabitants. Since the

BOKHARA

separation of Samarcand there are now only two towns of importance in Bokhara, namely, the chief town Bokhara, with a population of about 60,000; and Karshi, with about 25,000. Besides these there are a few small towns and some hundred villages in the country. The capital, according to Vámbéry, the centre of Tartar civilization, is ill built and has a gloomy aspect, and in luxury of dress and mode of life is far behind the towns of western Asia. Among the people there reigns the utmost moral corruption along with a rigorous adherence to outward forms. The country is distinguished from the other countries of Central Asia by its numerous schools, and in the same proportion by the amount of culture diffused among the people generally; but the women are even more degraded than in other Mohammedan countries. The rule of the emir is absolute, though he is to some extent under the influence of the clergy. The manufactures are unimportant, but there is a very considerable caravan trade, cotton, rice, silk, and indigo being exported, and woven goods, sugar, iron, etc., being imported. There is also now a trade by railway, since the making of the line from the Caspian to Samarcand. Bokhara is remarkable for its religious fanaticism, and various European travelers have been exposed to danger. After Alexander Burnes had visited Bokhara on a commission from the government of India in 1832, the British ambassador in Teheran sent Col. Stoddart in 1838 to obtain from the Emir Nasrulla the deliverance of the Russian prisoners that he had taken on his predatory incursions into Russian territory. Nasrulla, however, irritated at the neglect to answer his letter to the queen of England, ordered Col. Stoddart to be thrown into prison, and after treating him with great cruelty, compelled him to acknowledge the Mohammedan creed. Capt. Conolly, who had been with a similar object in Khiva and Khokand, came in 1841 to Bokhara, and after having to submit to the same treatment as Col. Stoddart, was executed along with him in 1842. Information of their fate was brought to Europe by the missionary Wolff, who had been sent to Bokhara in 1843 for this purpose.

In 1850 the Russians established themselves at the mouth of the Sir (Jaxartes), where it flows into the Sea of Aral, and in 1864 they found it necessary to proceed farther up the river. They made themselves masters of the two towns Turkestan and Aulie-ata, and after bringing them into communication with one another, invested Chemkend, Niazbek, and Chinab. The land thus occupied, which up to that time had formed the northern half of the khanate of Khokand, was, along with some other districts that had previously been annexed to Russia, erected into the Russian government of Turkestan, and incorporated with the general government of Orenburg, by the ukase of 14 Feb. (26) 1865. By a subsequent ukase, dated 11 July (23) 1867, this territory was constituted a general government. Soon after the khan of Khokand invaded the Russian territory, in consequence of which the Russians advanced still farther south and attacked Tashkend, which they took on 28 June 1865. They did not, however, incorporate Tashkend with the Russian territory, but declared it an independent khanate under the protection of Russia. This arrangement was opposed by Muzaffer-

Eddin, Emir of Bokhara, whereupon the Russian general Romanovski again assumed the offensive, and marching into Bokhara took Khojend by storm on 5 June 1866. In this way Russia came into the possession of the whole basin of the Sir. Not long after Tashkend was incorporated with the Russian territory by the desire of the inhabitants. Meanwhile the war with Bokhara still went on, and peace was not concluded till the beginning of 1867. This peace, however, did not last long. The war was renewed in the spring of the following year, and it was only in July 1868 that the terms of peace between Russia and Bokhara were finally agreed upon. Bokhara was to give up Samarcand and Katti Kurghan, along with the surrounding districts (constituting the tract of land watered by the Zerafshan), and at the same time promised to pay an indemnity to Russia and to protect her trade. Since then the peace has not been broken, but the Emir of Bokhara has sunk more and more into a position of entire dependency on Russia. During the autumn the Russians intervened against the emir's son, who had risen in revolt against him, and on 12 October in the following year the emir sent an embassy with presents (tribute) to the czar at St. Petersburg. In the meantime Muzaffer-Eddin had fallen into a dispute with Afghanistan. Shere Ali Khan, of Kabul, had given a favorable reception to the rebellious son of the emir, and Muzaffer-Eddin, probably in consequence of encouragement from Russia, now thought himself able to make good his former claim to Badakshan, and the territory lying about the sources of the Oxus, especially since the Khan of Kabul seemed to have but a slight hold of these parts. He had accordingly already sent out an army with the view of conquering those parts, when, toward the end of 1869, pressure being put upon him by Russia, he concluded a treaty with Kabul by which the Oxus was fixed as the boundary of the conterminous states, and this boundary was afterward recognized by Russia and England. After the Russian expedition to Khiva in 1873 an agreement was made between Russia and Bokhara on 28 September of that year, according to which Bokhara received a portion of the territory that had been ceded by Khiva to Russia, while the Russians received various privileges in return. Muzaffer-Eddin died in 1885, and was succeeded by his son Abd-ul-Ahad. Bokhara will probably be ultimately completely placed under Russian administration, for what little power it had lapsed in 1884 by the practical absorption of the country, resulting from the annexation of Merv. Since 1885 the troops, which were formerly ill trained and badly armed, have been drilled by Russian instructors and armed with rifles. See Le Messurier, 'From London to Bokhara' (1899); O'Donovan, 'The Merv Oasis' (1880); Curzon, 'Russia in Central Asia' (1889).

Bokhara, the capital of the khanate of the same name, in lat. 39° 48' N.; lon. 64° 26' E. It is eight or nine miles in circuit, and is surrounded by a mud-wall. It is poorly built, consisting of extremely narrow streets and paltry houses. The principal edifices are the palace of the khan, crowning a height near the centre of the town and surrounded by a brick wall 70 feet high; and numerous mosques, the largest of which is enameled

BOL — BOLESLAS

with tiles of azure blue, and has a tower 210 feet high. The trade was formerly large with India, but has now been almost completely absorbed by Russia. There are several manufacturing establishments producing blades, various metal articles, silks, and cloth. The pop. (estimated) 60,000.

Bol, *böl*, **Ferdinand**, Dutch painter: b. Dordrecht, 1610; d. Amsterdam, 1681. He was the pupil of Rembrandt, and is best known by his admirable portraits, in the style of that master, though he likewise executed several historical paintings of merit. Many of his works are still to be seen at Amsterdam. He also practised etching with success. His best known portrait is that of Saskia, the wife of Rembrandt, now in the Brussels Museum.

Bolan (*bō-lān'*) **Pass**, a celebrated defile in the Hala Mountains, leading from Sind into Beluchistan. It is about 60 miles long, hemmed in on all sides by lofty precipices, and in parts so narrow that a regiment could defend it against an army. It is traversed by the Bolan River. The crest of the pass is 5,800 feet high. The English government has recently built a railway through the pass to connect Sind with Kandahar.

Bolas (that is, "balls"), a form of missile used by the Paraguay Indians, the Patagonians, and especially by the Gauchos of Argentine. It consists of a rope or line having at either end a stone, ball of metal, or lump of hardened clay. When used it is swung round the head by one end, and then hurled at an animal so as to entangle it.

Bolbec, *böl-běk*, a town in France, department of Seine-Inferieure, 17 miles east-northeast of Havre; agreeably situated on the side of a hill, washed by the Bolbec, which supplies waterpower for its mills, and at the junction of four valleys. It is a thriving and industrious place, and well situated for commerce. Its printed cottons and handkerchiefs have long been held in high estimation. Besides these it produces linen and woolen stuffs, lace, cotton, velvet, and thread, and has several dyeworks and tanneries, with a considerable trade in grain, horses, and cattle. Pop. about 15,000.

Boldini (*böl-de'ne*) **Giovanni**, Italian artist: b. Ferrara, 1845. He studied for some time in London, and many of his paintings are found in American collections. His portraits have been especially commended. Among his works are 'Gossips'; 'The Connoisseur'; 'Kitchen Garden'; and 'Portrait of Menzel.'

Boldrewood, **Rolf**. See **BROWNE, THOMAS ALEXANDER**.

Bole, a term applied to various clay-like substances. They are chiefly hydrous silicates of aluminum and iron. It is of a dull yellow, brownish, or red color, feels greasy to the touch, and yields to the nail. It has a conchoidal fracture; its streak is shining, and it is opaque or slightly translucent. Bole is found in various localities, such as Armenia, Saxony, Tuscany, and the isle of Skye in Scotland. In ancient times, under the name of Lemnian bole or earth, it had a place in the *ateria medica*, but is no longer used. At present

the only bole of commerce is a coarse pigment sold under the name of Berlin and English red.

Bolero, *bō-lā'rō*, the name given by the Spaniards to a number of their national dances of the ballet class, which in Spain are regularly performed in theatres between the different pieces. They are danced both by men and women, the male dancers who take part in these performances being also called *boleros*, while the females are called *boleras*. The dances of this class which are best known and most in vogue are known by such names as the *Cachuca*, *Iota aragonesa*, *Madrileña*, *Ole*, *Ialeo de Jerez*, etc. They are danced by one or more couples, or, as in the case of the indecent *Ole*, by a single female dancer. The dancers wear the Andalusian costume, partly because of all the national dresses of Spain this is the richest and most elegant, and partly because the greater number of the *boleros* are of Andalusian origin. The music for these dances is always played by the orchestra, and is generally marked by rapid changes of time. The melodies are often very beautiful, and are always based upon some of the national airs. The dancers mostly beat time to the music with the castanets (*castañuelas*). These dances, when the performers are well trained and handsome, have a very powerful effect on the spectators, consisting as they do of graceful attitudes and movements of the body, and being strictly speaking not dances, but pantomimes. The dancers endeavor to express by their gestures all the different phases of the passion of love, and this often in a manner which passes far beyond the bounds of modesty. The dances of the common people, on which the *boleros* are founded, are essentially distinguished from the latter by the fact that the former are accompanied by singing,—partly that of the performers, partly that of the spectators,—while the music is mostly supplied by the guitar, or in some cases by the tambourine. They are very simple, but at the same time very graceful. The dancers beat time with the castanets, as in the *boleros* properly so called.

Boleslas, the name of six kings of Poland and three of Bohemia. The most celebrated of them, Boleslas, surnamed the Great, and the first Polish sovereign who had the title of king, was son of Duke Mietchislaf, and succeeded him in 999. He completed the work of introducing Christianity which his father had begun, contributed greatly to the progress of civilization, and brought the army under regular discipline. The Emperor Otho III. resolved to ascertain his real character by visiting him in person, and was so much pleased with the deference with which he was received, that he crowned him with his own hands in 1001, and exempted him from all homage and tribute. Boleslas assumed all the splendor of his new dignity and became a powerful sovereign. He not only repelled an aggression on his territories by the Duke of Bohemia, but became in his turn the aggressor, and conquered Moravia. Success awakened a desire for new conquests, and the Russians, who hitherto had always been the aggressors, were attacked in their turn, and were obliged to purchase peace by the cession of large tracts of territory. He afterward turned his arms to the north of Germany, and compelled the greater part of the northern sovereigns to

become his tributaries. In 1012 a formidable league was formed against him by the emperor of Germany and the dukes of Bohemia and Austria; but the allies were glad to conclude a peace with him in 1018. His last campaign was against the Russians, whom he signally defeated in a great battle on the banks of the Bug. After 20 years of continued warfare he was permitted to enjoy peace, and effected numerous internal improvements, promulgating excellent laws, and even putting a check upon his own power by the appointment of a council of 12 to act as mediators between the sovereign and the people. This body was the germ of the Polish senate. Boleslas died in 1025, after a reign of 26 years, which is one of the most glorious in the annals of Poland, and has handed down his name as one of the greatest sovereigns of his time.

Bole'tus, a genus of fungi of the order *Hymenomycetes* (fungi provided with a cap and a fructiferous membrane or hymenium which covers the sporules contained in the tubes). The greater number of the species are globulose, from which the Italians called them *ovoli*. The characters of the genus are, broad, hemispherical cap, the lower surface formed of open tubes, cylindrical in form, and adhering to one another. The tubes can be separated from the cap, and contain little cylindrical capsules, which are the organs of reproduction. They differ from the *Polyporei* by the absence of the membrane which encloses the tubes. *Boletus edulis* has the pedicle thick, especially at the base, and marked with red and pale white. The cap is also thick, smooth, and fawn-colored. The tubes are very small, rounded, and pass from white to a greenish yellow. It grows on the ground abundantly in woods during summer. The flesh is firm, and has an agreeable nutty flavor. It is a considerable article of commerce in France, particularly around Bordeaux. It is also found in England, but more rarely. The other species of *Boletus* are numerous.

Boleyn, bül'ën, Anne, queen of England, one of the wives of Henry VIII.: b. probably in 1500; d. 26 May 1536. The name is also spelled Bullen and Bouleyne. Her father, Sir Thomas Boleyn, had been several times sent by Henry as ambassador to France, and her mother was a daughter of the Duke of Norfolk. At the age of 15 years Anne accompanied to France as maid of honor the Princess Mary of England, betrothed to Louis XII.; but when that princess three years later returned to England a widow, Anne did not follow her, but remained at the French court, the freedom and gaiety of which suited her natural disposition, and where she was admired for her beauty and wit. She was attached to the household of Claudia, wife of Francis I., after whose death she was for a time in the service of the Duchess of Alençon, sister of Francis I. Young, beautiful, gay, and witty, she was an object of great attraction in the gallant court of Francis I. She returned to England about 1522, and became lady of honor to Queen Catharine, whom she soon supplanted. The king, passionately enamored of her, found an unexpected opposition to his wishes, and Anne firmly declared that she could be had on no terms but those of marriage. She knew that the king already meditated a divorce from his wife, Catharine of

Aragon; but she also knew what difficulties the Catholic religion opposed to the execution of this plan. Cranmer offered his services to bring about the accomplishment of the king's wishes, and thus gave the first occasion to the separation of England from the Roman Church. But the impetuous Henry did not wait for the ministers of his new religion to confirm his divorce; on the contrary, he married Anne in January 1533, having previously created her Marchioness of Pembroke. When her pregnancy revealed the secret, Cranmer declared the first marriage void, and the second valid, and Anne was crowned queen at Westminster with unparalleled splendor. In 1533 she became the mother of the famous Elizabeth. She could not, however, retain the affections of the king, as inconstant as he was tyrannical; and as she had supplanted her queen while lady of honor to Catharine, she was now supplanted herself by Jane Seymour, her own lady of honor. Suspicions of infidelity were alleged, which appear to have had no foundation in truth, but were doubtless eagerly laid hold of by Henry as a color for his violent proceedings. In 1535 she was accused, and brought before a jury of peers. Smeaton, a musician, who was arrested with others, asserted that he had enjoyed the queen's favors, and 17 May 1536 she was condemned to death by 26 judges. Anne in vain affirmed that she had long before been contracted to the Duke of Northumberland, and therefore had never been the lawful wife of Henry. Cranmer in vain declared the marriage void. The sentence of death was executed by the command of the inflexible Henry, who esteemed it a great exercise of clemency to substitute the scaffold for the stake. The last day of the life of this unhappy woman, 19 May 1536, presents many interesting moments. She sent for the wife of the lieutenant of the Tower, threw herself upon her knees before her and said, "Go to the Princess Mary (daughter of Catharine) in my name, and in this position beg her forgiveness for all the sufferings I have drawn upon her and her mother." "She sent her last message to the king," says Hume, "and acknowledged the obligations which she owed him in uniformly continuing his endeavors for her advancement." "From a private gentlewoman you have made me first a marchioness, then a queen, and as you can raise me no higher in this world, you are now sending me to be a saint in heaven."

See Strickland, 'Queens of England' (Vol. II., 1875-80); Dixon, 'Two Queens' (1873-4); Friedmann, 'Anne Boleyn' (1885).

Bolgrad, Russia, a town on the river Yalpookh, in the Lower Budjak, colonial district of Bessarabia, 162 miles from Odessa and 30 miles from Ismail. It is celebrated for the frequent mention made of it in the discussions relative to the territorial difficulties of Russia with Turkey in the Treaty of Paris of 1856. Pop. about 13,000.

Bolingbroke, Henry St. John (Viscount). English statesman, b. Battersea in Surrey, 1678 (baptised 10 Oct.); d. Battersea, 12 Dec. 1751. He was the son of Sir Henry St. John, afterwards Viscount St. John, of Battersea, and Mary, daughter of Robert Rich, Earl of Warwick, thus being (in Goldsmith's words) of a family "of the first rank, equally conspicuous for its antiquity, dignity, and large possessions."

BOLIVAR

As a child he was brought up in the house of his grandmother, a rigid Presbyterian, where his early and enforced studies of Dr. Manton's famous commentaries are supposed to have "prepared him to become a High Churchman." However, he went early to Eton, where he completed his education, although it was long asserted that he went to Oxford (Christ Church). About 1698-9 he travelled abroad, and lived generally for a time, with all the avidity of youth and of high spirits, what is called a life of pleasure. He dabbled a little in literature; but his chief ambition seems to have been distinction in dissipation. In 1700 he married Frances Winchescombe, daughter and co-heiress of Sir Henry Winchescombe; and entered Parliament for the family borough of Wootton Bassett in Wiltshire. His brilliant oratorical abilities speedily attracted attention; and he eventually cast in his lot with the then dominant Tories, of whom Harley (the Speaker) was the leader. In 1702 he received an honorary doctor's degree at Oxford. Two years later, when Harley became Secretary of State, he was made Secretary of War, a post which he retained until February, 1708, when upon the accession of the rival Whig party under Marlborough and Godolphin, he and Harley went out together.

For the next two years he led a retired life. But in August, 1710, the political whirligig restored the Tories to power with Harley again at their head; and Bolingbroke sitting in the new Parliament as member for Berkshire, became Secretary of State for Foreign Affairs. In 1712, he was created Viscount Bolingbroke and Baron St. John of Lydiard Tregoze, and he bore a chief part in the "vile Utrecht Treaty," as Prior calls it, of March, 1713. By this time his friendship for his temporising, sluggish coadjutor had greatly declined; and the last years of their political alliance were years of wrangling hostility, which Swift (the friend of both) strove vainly to mitigate. Then when, at last, Bolingbroke had compassed the downfall of Harley; and was intriguing for a Jacobite succession, Queen Anne died suddenly in August, 1714, and changed the aspect of affairs.

With the accession of George I., Bolingbroke's power passed away. The new King dismissed him, and after a short time he found it expedient to fly to France. His impeachment and attainder speedily followed. In France, where he remained seven years, he became Secretary of State to the Pretender, by whom also he was eventually dismissed for alleged neglect of duty. In October, 1718, his first wife, with whom he had never got on very well, died; and in 1722 he was married to Marie-Claire Deschamps de Marilly, widow of the Marquis de Villette, by whose exertions, and interest with King George's mistress, the Duchess of Kendal, he was ultimately allowed to return to England. In 1725 his property was restored, but he could not recover his rights as a peer, and was thus excluded from the House of Lords. At this date he resided at Dawley, near Uxbridge, where he occupied himself in the preparation of philosophical treatises, and of political articles in the 'Craftsman,' 1727-34, in opposition to Walpole. In 1735, finding it hopeless to re-enter political life, he retired again to France, where

he lived at Chantelou in Touraine until his father's death in the spring of 1742. This brought him again to his paternal home at Battersea. Here for nine years longer he for the most part resided until 12 December, 1751, when he died of a cancer in the face,—the long torture of which he bore with exemplary fortitude. His second wife, to whom he was tenderly attached, had died in the previous year. Both were buried at Battersea, where there is a monument to them in the parish church, with medallions by Roubillac.

Bolingbroke's biographers have dwelt effectively upon his personal advantages, his handsome presence, his mingled dignity and sweetness, his vivacity, his wit, his marvellous memory, and his quickness of apprehension. "His mind," said Swift, who loved him, "was adorned with the choicest gifts that God has yet thought fit to bestow upon the children of men," and he refers especially to his "clear judgment," "his most agreeable elocution," and his "invincible eloquence." Of his eloquence, whether in speech or script, there is no doubt, and writer after writer has spoken to its seductive charm. His patriotism, upon which he himself insisted, has also found sturdy advocates. But in the main, he is now regarded rather as a brilliant and meteoric intriguer than a really great statesman with honest convictions; while his boasted philosophy and his learning are held to be equally unsound and superficial. Pope, his pupil in the 'Essay on Man,' is the accredited mouth-piece of his religious opinions; and it is a current criticism of Pope's cleverly executed thesis that it is an exposition of undeveloped doctrine by a disciple to whom it was unintelligible.

Apart from Bolingbroke's political tracts, and contributions to the 'Craftsman,' the bulk of his writings were published posthumously. The Letters on the 'Spirit of Patriotism,' and the 'Idea of a Patriot King' appeared in 1752 and 1749; the 'Letters on the Study of History' in 1752; and the 'Letter to Sir William Windham; a vindication of his conduct up to 1716, generally regarded as his best work, in 1753. In 1754 his dependant, David Mallet, published his 'Philosophical Writings' in 5 vols. It was this publication which gave rise to the celebrated utterance ascribed to Dr. Johnson about the "beggarly Scotchman," who was paid to let off Bolingbroke's blunderbuss against religion and morality after his death. But Johnson told Boswell that he had "never read Bolingbroke's impiety."

Bibliography.—Bolingbroke's 'Life' has been written by Mallet (see above); Macknight (1863); Harrop (1884); Hassall (1889); and latterly (exhaustively and appreciatively) by Walter Sichel (1901-2). Consult also 'Bolingbroke, a Historical Study,' by Churton Collins (1886).

AUSTIN DOBSON,
Author of 'Life of Goldsmith'; 'Life of Richardson,' etc.

Bolivar, Simon, sê-môn' bô-lě-vâr, South American liberator: b. Caracas, 24 July 1783; d. San Pedro Alejandrino, 10 Dec. 1830. He was educated in Spain, and, when but 18 years old, married in Madrid. His wife died

soon afterward. The sources of the inspiration of his life's work were: (1) The spectacle of the French Revolution; (2) the example of the United States, which country he visited in 1809; (3) the personality of Gen. Miranda, the leader of the revolutionary movement in Venezuela, who had openly and vigorously attacked Spain's colonial government. Bolívar offered his services to the revolutionary junta a year before Venezuela declared its independence, which was on 5 July 1811.

The revolutionists being at first overwhelmed by the Spanish forces, Bolívar fled to Curaçao. In September 1812 he was at Cartagena; next, we see him scoring against the Spaniards in New Granada; then marching back into Venezuela with only 500 men, but winning so many recruits among the inhabitants that he could meet and defeat Gen. Monteverde at Lastoguanes. He entered Caracas in triumph, 4 Aug. 1813, but suffered defeat in July 1814, and Caracas was again a Spanish town. He then went back to New Granada, succeeding at Bogotá; failing at Santa Marta; resigning his commission, and sailing for Kingston, Jamaica, in May 1814. Next, from Aux Cayes, Haiti, he set out with a little force that President Petion equipped; but this expedition, landing in Venezuela in May 1816 was a failure. Again reinforced at Aux Cayes, he landed (December 1816) in Margarita, and (16 Feb. 1817) at Barcelona, for a three days' battle with Gen. Morillo. The latter was defeated. Bolívar was made commander-in-chief, with headquarters at Angostura. Offering to resign his command to a migratory Congress (15 Feb. 1819), he was urged to continue the war; reorganized the army; crossed the Cordilleras; joined forces with Santander, republican leader in New Granada; caught the Spaniards unawares; entered Tunja July 1819, and on 7 August won the battle of Boyacá. On 17 Dec. 1819 Venezuela and New Granada were merged in the new Republic of Colombia, which included both and absorbed Ecuador after the victory in Bomboná—the union continuing until the close of 1830. Spain made another effort, sending Gen. Torre to take command of her forces; but Torre was defeated on the field of Carabobo, in the central part of Venezuela, 25 June 1821. The constitution of Colombia was adopted, 30 Aug. 1821, and its government inaugurated with Bolívar as president and Gen. Francisco de Paula Santander as vice-president.

But in that great region lying south of Colombia and north of Chile and Argentina Spain was still strong. At the request of the Congress of Peru, Bolívar sent reinforcements under the command of Gen. Antonio José de Sucre, and went in person to the scene of action. Quito was occupied in June 1822; next, the Liberator assumed the presidency at Lima; on 6 Aug. 1824 he triumphed at Junín. Before the end of that year Sucre gave the *coup de grace* to Spain's colonial system on the mainland (though at widely separated points hopeless resistance was offered a little longer), by capturing Viceroy Laserna, General-in-Chief Aymeric, and other Spanish commanders and officers (see AYACUCHO). In June 1825 Bolívar visited Upper Peru, a region of vast extent, which, in his honor, received the name Bolivia (q.v.) when it was organized as a separate

republic. In December 1826, returning to Venezuela (where Gen. José Antonio Páez and Admiral José Padilla had destroyed the remnants of Spanish power on the northern coast), he was re-elected to the presidency, though manifesting great reluctance to retain an office the powers of which were wholly inadequate to the task of holding together in a permanent union three states such as Venezuela, New Granada, and Ecuador. Then two important steps were taken: (1) Leaders of the people assured him that he alone could avert disaster and disruption; (2) he himself assumed and attempted to exercise such powers as, in his opinion, were necessary to control the situation. At the height of his fame and strength (for he was in his 47th year), on the eve, however, of a great failure,—for the tendency to disunion in the country freed and consolidated by him had grown beyond control,—Bolívar resigned his command and died.

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Bolívar, Colombia, a northern department of that republic, bordering the Caribbean Sea; area 21,345 square miles. The surface of the country is low and heavily wooded, agriculture having made but little progress. The most important rivers are the Magdalena, the Cauca (a tributary of the former), and the Sinu. Capital, Cartagena. Pop. about 300,000.

Bolivia, bō-lēv'yā, an inland republic of South America, bounded on the north and east by Brazil, northwest by Peru, southwest by Chile, south by Argentina and Paraguay. It extends from north to south between lat. 10° 20' S. (see ACACÉ RIVER) and 22° 50' S. and from east to west between lon. 57° 47' 40" W. (Compare treaty with Brazil 17 Nov. 1903) and about 72° W. Area, exclusive of Acre and Chaco claims, estimated at 560,000 square miles.

The principal centres of population are now, and apparently have always been, located in the mountainous region of the western half of the country, called the Sierra. The eastern districts, stretching away from the slopes of the Cordillera far into the torrid interior of the continent, where are the sources of the Amazon's great tributary, the Madeira River, as well as of the Paraguay, a part of the system of the Rio de la Plata, are covered with tropical forests, are but sparsely settled. Running southeast through the departments of La Paz, Cochabamba, and Potosí is the principal range of the Andes Mountains, called the Cordillera Real. Here are the rich mineral districts of Bolivia: the Cerro Rico de Potosí alone has produced up to the present time about \$2,000,000,000 worth of silver. Here are some of the highest mountains of America and one of the greatest continuous snow-ranges in the world, having an average altitude of 20,000 feet, with the superb peaks of Illimani, Huaina-Potosí, and Illampu lifted 5,000 or 6,000 feet still higher above their gigantic associates. The western range of the Andes continues in a line parallel with the Pacific coast, rejoining the Cordillera Real near Bolivia's southern boundary. Between these two ranges are the high plains, 12,000 to 13,000 feet, and Lake Titicaca, 12,488 feet, above the sea-level. This great sheet of water, 120 miles long, and from 30 to 50 miles wide, has an average depth of 100 fathoms. Lying southeast

BOLIVIA

of Lake Titicaca are the two most famous cities of the republic, La Paz and Sucre. A railway from Mollendo on the Peruvian coast climbs up to the plateau, but where it passes over the western range of the Andes the track is 14,765 feet above the sea. On the Pacific side, then, the problem of transportation is very difficult; moreover, as is shown below, the republic has been deprived of the little strip of seacoast that was formerly in its possession.

Turning now toward the east, we find some of the best farming lands in the world, but here also the means of transportation are inadequate, and the products must be carried a great distance before reaching the Atlantic Ocean. The agricultural methods are incredibly primitive. Indian communities or wealthy townspeople own the farms; the Indians plow the land in a fashion that has been thus described:

Oxen are yoked by lashing a light crosspiece of wood immediately behind the horns. To this rude yoke is fastened the long beam of the wooden plow, which is almost exactly like those used by the people of Egypt thousands of years ago. It has but a single handle, and a flat piece of iron is fastened with rawhide at the point of the crooked stick. This cuts the soil to a depth of about six inches. Clods are broken by hand, and the ground is further prepared by dragging a heavy tree over it until the soil becomes smooth.

The roads are but narrow trails winding along the mountain sides, and are for the use of pack animals exclusively. Mules and llamas, driven by Indians, carry loads of coffee, cacao, cinchona bark, wool, and the precious metals.

Natural Wealth and Commerce.—The natural wealth of Bolivia may be shown by an enumeration of the products of its chief geographical divisions, called departments. The department of Potosí is exceedingly rich in silver, tin, and bismuth. Gold also is found in Chilco de Chichas; nitrate in San Cristobal de Lipez, and red and white copper, topazes, emeralds, opals, jasper, and marble in Lipez. The department of Tarija has an abundance of copper, silver, gold, asphalt, marble, etc. Sucre contains silver, tin, coal, lead, copper, gold, and mineral asphaltum. Cochabamba has gold mines that were famous during the time of the Spanish dominion; also silver and marble. Santa Cruz contains rich gold mines that are worked by the natives only; also large deposits of iron ore. La Paz contains famous mines, such as Tipuani and Yani (gold), and Chuquioguillo (silver). Copper, bismuth, tin, marble, antimony, and coal are also found. Oruro contains silver, tin, gold, copper, iron, lead, bismuth, antimony, sulphur, feldspar, borax, topaz, and amethysts.

Though ranking high in the production of silver, Bolivia is essentially an agricultural and grazing country. The province of Lipez has great herds of alpacas, vicuñas, sheep, and llamas. Alfalfa and barley grow in Chichas; sugarcane, coffee, wool, potatoes, cereals, flour, and fruits are produced in Charcas (Potosí). In the valley of the Paraguay River, department of Tarija, cacao, wines, maize, barley, and vegetables are the chief products. Cattle and horses abound upon the pasture-lands of the province of Azero. Rice, dairy products, and all varieties of fruits, European as well as tropical, are mentioned among the possibilities or actual achievements in the comparatively small portion of these eastern districts as yet brought under cultivation. Immense areas are covered with

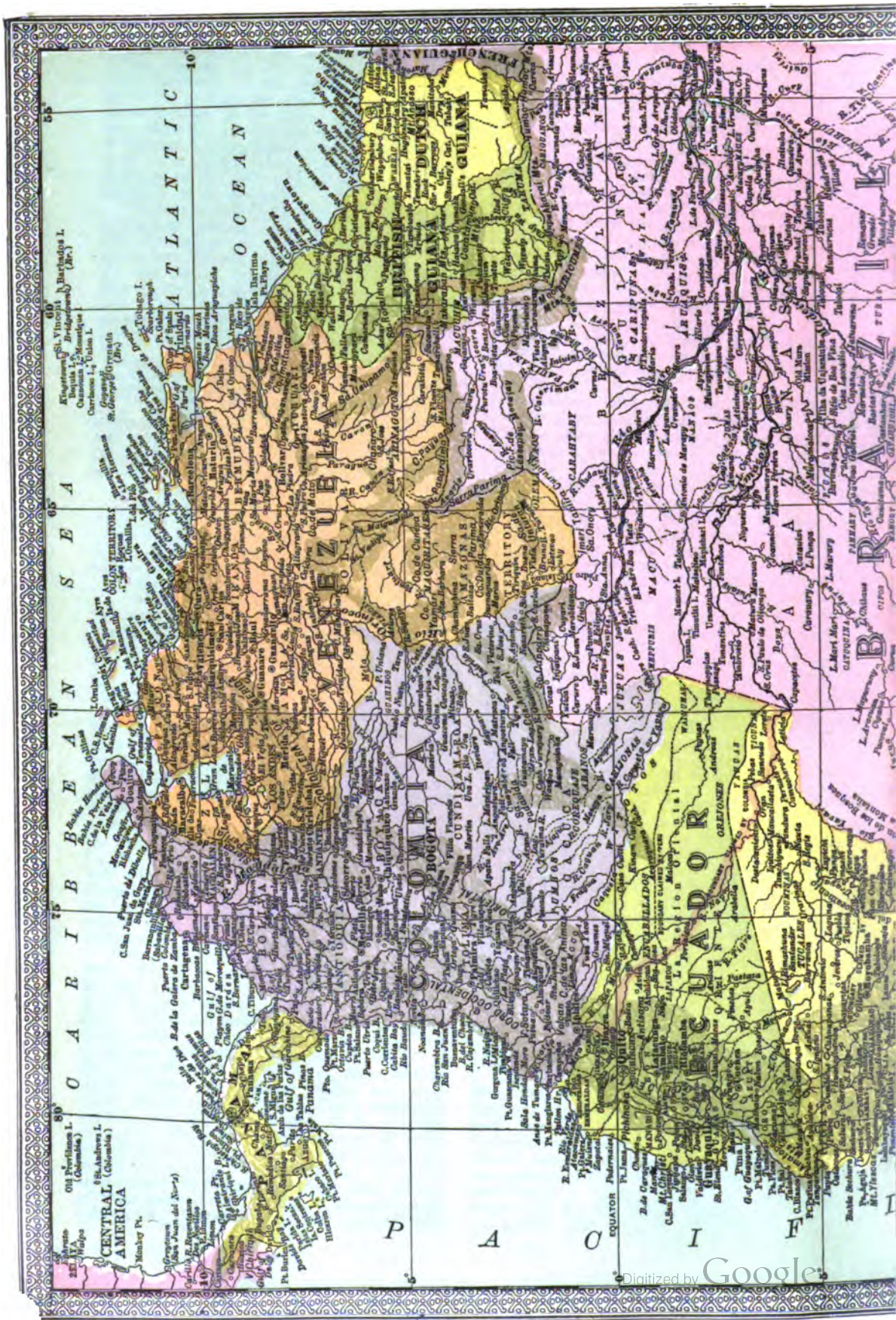
rubber-trees, and valuable cabinet- and dye-woods, cedar, mahogany, etc., are among the unexploited treasures of the forests. The exports of rubber from the territory of Acre are about 4,500,000 pounds annually. Geographically, a large part of northeastern Bolivia belongs to the Amazon River system, the natural outlet for its products being the waterways of Brazil; and until this opening to the commerce of the world is secured it will remain buried alive. See *ACRE RIVER* and *SOUTH AMERICA*.

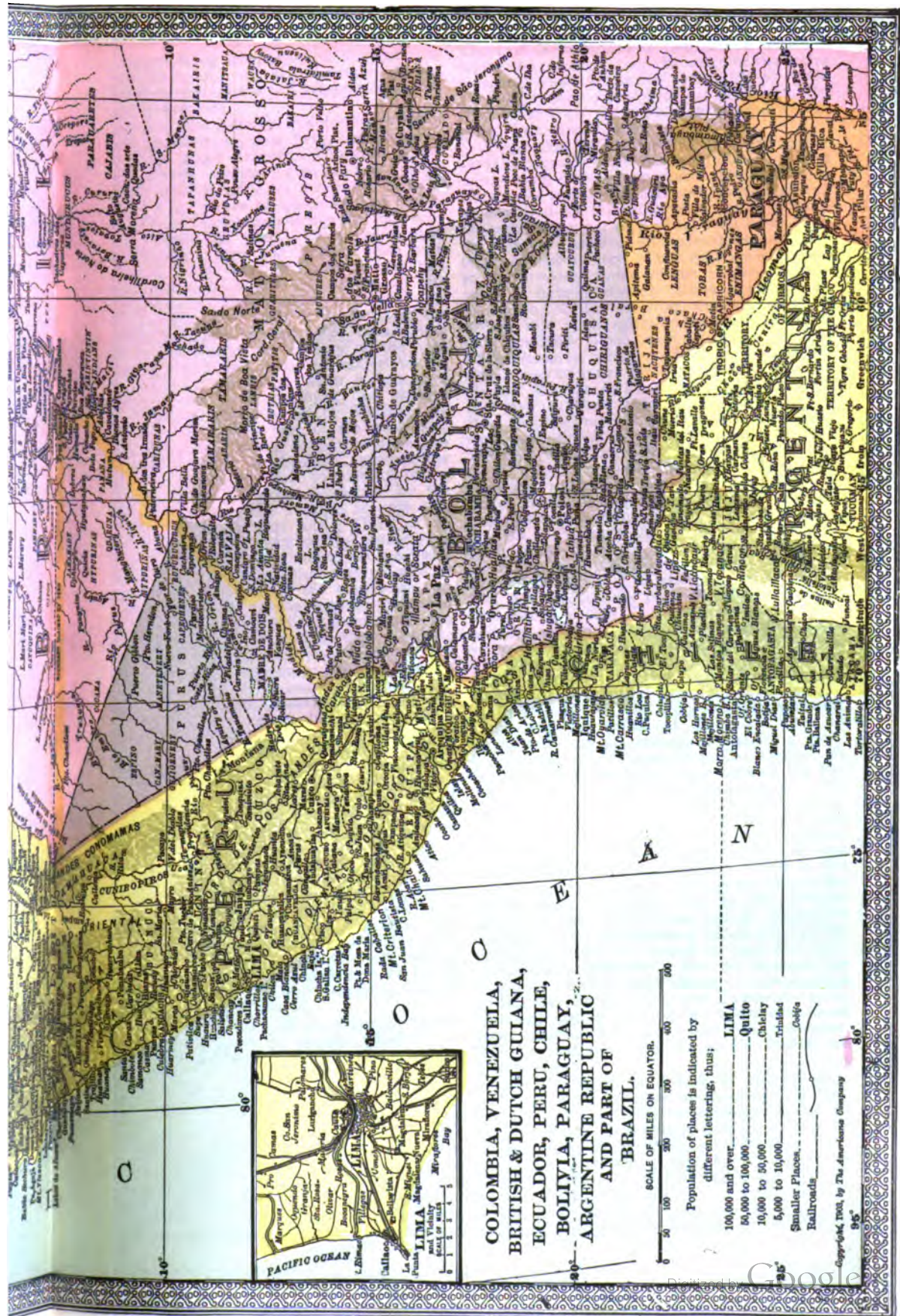
The exports of the entire nation in 1909 amounted to \$22,702,728. The value of imports in the same year was \$14,774,776; of which amount Germany supplied merchandise of the value of 5,320,999 bolivianos; Great Britain, 7,894,344; France, 1,479,647; United States, 10,873,604; Chile, 3,309,995; Peru, 2,533,970; Belgium, 1,568,064; and Argentine Republic, 1,691,205. (A boliviano being worth about 40 cents U. S.)

Government Receipts and Expenditures.—For the year 1909, financial obligations of the Republic were punctually met, despite the very considerable loss in revenue derived from custom-house receipts. On 1 Jan. 1910 the Bolivian debt was \$3,104,130. A new loan of \$7,500,000 was sought in 1909 through Congress.

Population.—The population is classified as, (1) whites, (2) Quichuas, (3) Aymaras, (4) Chunchos. The first class is composed chiefly of descendants of the Spaniards. The second class is numerically the strongest in the republic, the Quichua Indians being commonly employed either as domestic servants or as laborers in the mines. In the third class are Indians of a distinct tribe, who are found in the department of La Paz and the high plains of the western portion of Bolivia, especially in the neighborhood of Lake Titicaca, where they are employed in pastoral and agricultural pursuits. As for the members of the fourth class, they are aborigines whose scattered tribes,—now inhabiting the eastern departments of Chuquisaca, Beni, and Santa Cruz, with a few representatives also in La Paz and the central department of Cochabamba,—have not even the bond of a common language. There are not sufficient data on which to base an opinion as to their tribal relationships, nor has it ever been possible to make a close estimate of their numbers. It is probable, however, that they are fragments of the original population of this land, displaced by successive waves of invasion, the Aymaras having been the next tribe to gain possession of the great upland plateau. The Quichuas came in at a much later date, when the empire of the Incas was extended from Cuzco, Peru, through this region. While Spanish is the language of the ruling element, both Quichua and Aymara are also in common use, even among the whites. Estimate of total pop. 2,049,083.

The professions, and the best positions in the army, the public service, and mercantile business, are monopolized by persons of European descent. Below them are the Mestizos (persons of blended Indian and European blood), more commonly known as "Cholos"—the tradesmen, soldiers, small shopkeepers, etc., constituting a middle class. Lowest in the social scale are the Indian farmers, day laborers, miners, and servants. The lines between





BOLIVIA

these classes being uncertain and disputable as the national boundaries, the structure of Bolivian society forbids the full acceptance of free political institutions.

History.—The country was formed in 1825 from the province of Upper Peru, and named in honor of the South American Liberator, Simon Bolivar. Partly within Peruvian and partly within Bolivian territory are the waters of Lake Titicaca, on the shores of which we find monuments of a civilization antedating the Inca conquest by about 600 years. From the earliest times, therefore, Peru and Bolivia must have been united. The Incas of Cuzco overran this district in the 14th century, and 200 years afterward Hernando Pizarro added it to the conquest his brother had made at the heart of the Inca empire. Under the Spaniards, then, it was known as the district or territory of the high court of Charcas, and remained subject to the viceroy of Peru until 1776, when it became a province of the new viceroyalty of Buenos Ayres. Before the coming of Pizarro the Sierra supplied a large part of the gold used for the decoration of the temples and palaces of the Incas; after the Spanish conquest the natives were driven to work, to continue or increase the output of precious metals for the benefit of masters whose ruthless severity was conspicuous even in that age. There is no entirely trustworthy record of the numbers of those who perished in the mines, but we know that a large Indian population was reduced to its present proportions in the course of two centuries. Taxation was oppressive; provincial governors became monopolists, from whom the natives were obliged to purchase their supplies; here, as elsewhere in America, colonists were forbidden to raise any crops or manufacture any articles which could interfere with the industries of the mother country. Commerce was so strictly limited to Spain that even neighboring colonies were forbidden to have commercial dealings with one another. Toward the end of the 18th century the resentment of the Indians was expressed in several insurrections (1780-82); early in the 19th the provinces of Rio de la Plata and Peru aided the Bolivians in their struggle for independence (July 1809 to August 1825). Gen. Santa Cruz was in command of the expeditions from Lima which failed to drive out the Spanish troops in 1823. But in the following year Gen. Sucre, marching from the same country at the head of an army encouraged by the victory of Ayacucho, was favored by a rising of patriots in all the principal towns. By February 1825 La Paz was in the power of the revolutionists, and in March the Spaniards lost their only remaining stronghold, the province of Potosi.

Deputies from the various provinces assembled at the capital to decide whether the relation of dependence upon Argentina should continue or not. In August they reached the conclusion that they would undertake their own government, and before the dissolution of this Assembly (6 Oct. 1825) independence was declared. The Constitution adopted then (subsequently modified in important respects) was prepared by Gen. Bolivar, and in accordance with the views entertained by the great Liberator at this period in his career, when he was master of Colombia and Peru as well, it vested the supreme authority in a president chosen for life.

The first incumbent was Gen. Sucre, who accepted the presidency for the space of two years only, and took the further precaution to retain 2,000 Colombian soldiers for his protection. In 1827 he and his Colombians were actually expelled from the country.

Since 1827 Bolivia has had seventeen presidents or dictators, the average duration of their terms being about four years. In 1828 Santa Cruz came into power and was confronted with a revolution the following year. In 1835, interposing in a quarrel of political factions in Peru, he defeated Gamarra, and named himself Protector of that country. Chile refusing to consent to the proposed union of her neighbors, three years of fighting ensued. Santa Cruz was defeated and exiled in 1839, but his party in Bolivia kept up the agitation and finally conferred the presidency upon Gen. Ballivian. Meanwhile Gamarra, who had become President of Peru, tried to annex the department of La Paz. He lost his life in this attempt, and then the Bolivians in their turn would have invaded Peru if Chile had not again intervened. Ballivian surrendered his thankless task in 1848. The next President, Belzu, was borne into office on the crest of a wave of revolution; by a revolutionary storm his successor, Cordova, was driven from office and from the land. Linares made himself Dictator in 1858, and was deposed in 1861. President Acha, his successor, fell from power when his forces were defeated in battle by his political antagonist, Melgarejo (February 1865). The latter may be characterized as a revolutionist until 1865; President from that time until 1869; Dictator from 1869 to 1871. Morales, elected in the year last mentioned, was succeeded in 1873 by Ballivian, who died before a twelvemonth had passed. Frias, next to take office, was deposed two years later by the troops, who proclaimed Gen. Daza President.

In 1878 Bolivia and Peru were at war with Chile, and the defeat of the allies after 18 months of hopeless struggling against a well-prepared enemy stripped from the weakest of the contestants her only possessions on the Pacific. Bolivia became a landlocked country. The national anger vented itself first upon the President whom the army had lifted up, and who now fled to escape assassination. But Campero, whom Congress chose to carry on the war, and who personally led the Bolivian troops in the field, was wholly unable to oppose Chile's demands alone, and Peru was an ally without power to aid. Bolivia saw herself obliged to acquiesce in an arrangement which some of her leaders have not yet ceased to regard as provisional and temporary. Her bit of coast line and most of the coveted nitrate of soda deposits in the districts of Cobija and Tarapaca,—territory aggregating 70,181 square miles, with about 6,000 inhabitants,—passed into Chile's keeping. (For an account of the war on the Pacific, see CHILE; PERU.)

Coincidentally, the failure in 1879-80, after years of effort, to secure the opening of a commercial outlet for Bolivian products to the Atlantic through the Amazon River and its great tributary, the Madeira, was a severe blow. The American contractors for the Madeira and Mamoré Railway of Bolivia and Brazil were deprived of the funds necessary to the prosecution of the enterprise by the withdrawal of the loan that had been placed in England in 1872 for the

purpose of constructing this much-needed road. The decision to abandon the undertaking was reached after years of litigation, the final appeal being heard in the British House of Lords.

The Constitution of 28 Oct. 1880 vested the legislative power in a Senate and House of Representatives, and the executive power in a president elected for four years by direct universal suffrage. But little or no improvement in the political situation was observed. President Campero was succeeded by Gregorio Pacheco, and then came Aniceto Arce (1 Aug. 1888). It was necessary to declare a state of siege in all parts of the republic in the summer of 1890. Attempts were made to overthrow the government, and a number of political leaders were arrested. The election of a successor to President Arce took place 3 May 1892. Violent collisions between the rival factions again compelled the authorities to proclaim a state of siege—which was continued even after the inauguration of the new president, Baptista, on 6 August. Indian revolts also occurred in this year, originating in both the north and the south, and spreading rapidly through the entire country. The barbarous practices of the Indians were, as is usual in this most repulsive species of warfare, matched by the repressive measures of the Bolivian troops.

Chile furnished arms and money to uphold the Baptista government; and the dependence of the country without sea coast upon the country all sea coast was recognized in the treaty of 1903. Bolivia had been placed in a position such that any one of her three powerful neighbors,—Chile, Argentina, or Brazil,—could win her allegiance by conferring substantial favors, or even by a display of international courtesy. Following Chile's diplomatic overtures, Argentina undertook to open up a way to the sea by a new railroad connecting the Sierra with her river system. Brazil's attitude remained in doubt, until the treaty of 17 Nov. 1903 showed that Acre, competing with Brazil in the production of rubber, was demanded as the price of any concession of a right of way. Some of the neighboring states have, in times not long past, actually discussed the disposition to be made of Bolivia, as though this interesting country were a South American Poland.

It can hardly be said that Bolivia has given evidence of greater political stability in recent years. When Fernandez Alonzo was elected to the presidency in 1896 his opponents protested that the government had tampered with the returns in such a way as to change the expression of the people's will under the constitutional guaranty of universal suffrage, and an uprising was successful in April 1899. The revolutionists, under Col. José Manuel Pando, defeated the government forces in a pitched battle; President Alonzo fled over the Andes into Chile, and the government which has maintained itself until 1903 was organized, with Señor Pando at its head.

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Bolkhov, bōl-kōf' Russia, capital of a district of the same name in the government of Orel, on the Nugra. It is a very ancient place, and is chiefly built of wood. It has manufactures of leather, glue, soap, etc., and a considerable trade in hemp, hemp-oil, and tallow, amounting to more than \$800,000 annually. Pop. about 27,000.

Boll (from the Saxon *bolla*, a bowl), an old Scotch measure for corn, varying in different districts and for different articles. A boll of wheat or beans was equal to four bushels, a boll of oats to six bushels. The boll is still used in some parts of Scotland, but is no longer legally recognized.

Bol'lan, William, lawyer: b. England; d. Massachusetts, 1776. In 1740 he settled in Boston, Mass., married a daughter of Governor Shirley in 1743, and became advocate-general. In 1745 he was sent to London as the colony's agent, a post of great responsibility and requiring considerable ability in the holder. After three years of negotiating he secured from the English government the repayment of £183,649 advanced by Massachusetts for the Cape Breton expedition. In 1769 he secured and sent over to Massachusetts 33 letters of Gov. Bernard and Gen. Gage, denouncing and calumniating the colonists. He wrote a number of political tracts and pamphlets favoring conciliation with the colonists. Among them were: 'The Mutual Interests of Great Britain and the American Colonies Considered'; 'Continued Corruption of Standing Armies'; 'The Free Briton's Memorial, in Defense of the Right of Election'; 'Importance of the Colonies of North America and the Interests of Great Britain with Regard to Them Considered'; 'Petition to the King in Council, 26 Jan. 1774, with Illustrations'.

BOLLANDISTS — BOLOGNA

tions Intended to Promote the Harmony of Great Britain and Her Colonies'; 'The Importance of Cape Breton Illustrated'; etc.

Bollandists, a society of Jesuits which published, under the title 'Acta Sanctorum,' the well-known collection of the lives of the saints of the Roman Catholic Church. They received this name from John Bolland (died 1665), who edited the first five volumes from materials already accumulated by Heribert Rosweyd, a Flemish Jesuit, whose collections were entrusted to Bolland at his death in 1629. On the abolition of the society of Jesuits in 1773, it was removed to the monastery of Candenberg, in Brussels. The abolition of the monasteries by Joseph II. brought about its dissolution. A new association was formed in 1837 under the patronage of the Belgian government, and by it the publication of the great work was continued.

Bolles, Albert Sidney, writer on finance: b. Montville, Conn., 8 March 1846. He practised law for a time; then became editor of the Norwich (Conn.) *Bulletin*, and later of the *Banker's Bulletin*. For more than four years he was professor of mercantile law and banking in the University of Pennsylvania, and for eight years chief of the Pennsylvania Bureau of Industrial Statistics. Publications: 'Chapters on Political Economy'; 'Conflict Between Labor and Capital'; 'Industrial History of the United States'; 'Financial History of the United States, 1774-1885,' his most important work; 'Practical Banking'; 'The National Bank Act and its Judicial Meaning'; 'Pennsylvania, Province and State, 1609-1790.'

Bolles, Frank, author: b. Winchester, Mass., 31 Oct. 1856; d. Cambridge, Mass., 10 Jan. 1894. He graduated at Harvard Law School in 1882, and while there founded and became first president of what is now the Harvard Co-operative Association. He was an associate editor of the Boston *Advertiser* until chosen secretary of Harvard University in 1886. That office he made thoroughly human to the great gain of both students and faculty. He was in the truest sense the students' friend, and he endeared himself to hundreds, especially the diffident ones and those of limited means, by many acts of helpfulness. In a series of judicious and clear pamphlets he set forth the actual working of Harvard, its methods of instruction, the scope of its departments, etc., and did much to correct the impression that it was a rich man's college. He wrote three works of exceptional literary merit: 'Land of the Lingering Snow,' sketches written on an abandoned farm in the heart of the White Mountains; 'At the North of Bearcamp Water'; and 'From Blomidon to Smoky, and Other Papers.' In his descriptions of nature and scenery he is absolutely impersonal, and impartial as a scientist; he never moralizes or indulges in sentiment.

Bollman, Eric, adventurer: b. Hoya, Hanover, 1769; d. Jamaica, W. I., 9 Dec. 1821. He was a physician at Paris during the Revolution, accompanied the refugee, Count Narbonne to London in 1792, then established practice in Vienna to discover Lafayette's place of imprisonment. Finding it to be Olmütz, he joined an American named Francis K. Huger in rescuing him, though he was recaptured. Bollman was imprisoned nearly a year in Austria, then re-

leased on condition of leaving the country. He came to America, was in Philadelphia for years, then joined Burr's conspiracy in 1806 and was his agent in New Orleans; was apprehended and committed for treason in 1807, but discharged for lack of evidence (see below). In 1814 he returned to Europe, finally settling in London.

Bollman's Case, in United States law. Eric Bollman (above) was committed on probable suspicion of treason, 27 Jan. 1807, by the circuit court of the District of Columbia; the supreme court was moved for a writ of *habeas corpus ad subjiciendum* (the great writ against illegal confinement) to the marshal to bring him before the court. The questions were whether the court had the initial power to grant such writs, and if so, whether it could grant them against committals by the circuit court. John Marshall decided that it had such right both by common law, as the right of any superior court of record to guard the liberty of the citizen, and by express grant from Congress; and that the allegation of treason was immaterial, as the writ would be useless without the power to go behind the lower court's action and decide on the merits. William Johnson dissented. On the marshal's return it was moved that Bollman be discharged, because no place of commission of the treasonable act was cited, and because the evidence was insufficient and the crime even if proved did not amount to treason. It was decided that there must be an actual levying of war, not merely intent to do so to constitute treason, that the evidence at best did not even prove that, but only a culpable attempt against a power with which the United States was at peace.

Boll Weevil. See COTTON INSECTS.

Bollworm, a southern name for a caterpillar which bores into cotton balls. In the north it is called "corn worm." See COTTON INSECTS.

Bolo, the national weapon of the Filipinos. The blade is about 18 inches in length by nearly 3 inches in breadth at its broadest dimension. It tapers from the middle toward the haft as well as toward the point, making it strongly resemble the ancient short sword. It is not double edged, however, but tapers from a thick back to an extremely keen edge. The scabbard of the bolo is made of a native wood with rough outlined designs carved upon it. The whole weapon is much more beautiful in outline and more formidable than the Cuban machete.

Bologna, Giovanni di, jō-vân'ne de bō-lō'nya, sculptor and architect: b. Douai, in Flanders, about 1524; d. Florence, 1608. At an early age he went to Rome, where he passed two years in studying the masterpieces of art. Going to Florence, he was attracted by the works of Michael Angelo, and determined to pass the rest of his life there. He rapidly rose to the foremost rank among sculptors, and few artists were charged with the execution of so many and such important works. His surname of Bologna seems to have been derived from the celebrated fountain in that city, designed by himself, of which the crowning colossal figure of Neptune is one of the wonders of the modern city. His fine statue of Duke Ferdinand is said to have inspired Browning's poem, 'The Statue and the Bust.'

BOLOGNA — BOLOMETER

Bologna, bō-lō'nyā, Italy (anciently **BONONIA**), capital of the province of the same name. It lies at the foot of the Apennines, between the rivers Reno and Savena, 190 miles north-northwest of Rome. Bologna is five or six miles in circumference, and is surrounded by an unfortified wall of brick. It is an archbishopric, and has a tribunal of appeal in the first instance, and of commerce. It has extensive manufactures of silk goods, velvet, artificial flowers, etc. The town consists of four quarters, the older poorly, and the modern handsomely built. There are colonnades along the sides of the streets affording shade and shelter to the foot-passengers. Bologna was long renowned for its university, founded, according to tradition, by Theodosius the younger in 425, but more probably not till 1088, which, in the centuries of barbarism, spread the light of knowledge over all Europe. It once had 10,000 students, but the number is now about 1,500 only. Here the famous Irnerius taught the civil law in the 11th century, and students were attracted from every quarter. Several learned ladies have at different times been professors here, such as Laura Bassi, professor of mathematics and natural philosophy, and Matilda Tambroni, professor of Greek, and the predecessor of the famous Cardinal Mezzofanti. The university formerly possessed so much influence, that even the coins of the city bore its motto — *Bononia docet* ("Bologna teaches"). The law school enjoyed the greatest fame. Its teachers had the reputation of inculcating principles favorable to despotism, and were consequently rewarded by the favor of the emperors, and of the Italian sovereigns. Every new discovery in science and the arts found a welcome, and here Galvani discovered galvanism (1789). The medical school is celebrated for having introduced the public dissection of human bodies, and the scientific journals prove that the love of investigation is still awake in Bologna. The university, indeed, still enjoys an excellent reputation, and is well provided with scientific collections, the anatomical collection being especially extensive. It possesses in all five faculties. The university library numbers about 170,000 volumes, with 6,000 manuscripts. Since 1803 the university buildings have consisted of what was formerly the Palazzo Cellesi. The original university building now accommodates the public library, of some 200,000 volumes. The city has a picture-gallery (in the Accademia delle Belle Arte) and a museum of archæological and other objects. In the 16th century the famous painters and sculptors, Carracci, Guido Reni, Domenichino, and Albani, founded a school, to which their works have given great reputation. There were, even as early as the 12th and 13th centuries, great painters in Bologna. Francesco Francia was famous in the 15th and early part of the 16th century. The city picture-gallery is rich in the works of these and other artists, the gem of the whole being Raphael's St. Cecilia.

The chief square of the city, Piazza Vittorio Emanuele, formerly the Piazza Maggiore, with the Piazza del Nettuno at right angles, is adorned by several venerable buildings; among them are the Palazzo Comunale (or Del Governo), which contains some magnificent halls, adorned with statues and paintings; Palazzo del Podestà (dating from 1201), now the town hall, chiefly remarkable as having been

the prison of Enzius, king of Sardinia, and son of the Emperor Frederick II., who was captured and kept here by the Bolognese for more than 20 years, till his death; and the church or basilica of St. Petronio, with its unfinished front and the meridian of Cassini drawn upon a copper plate in the floor. Among the hundred other churches, the following are distinguished: St. Pietro (the cathedral), St. Salvatore, St. Domenico (containing the tomb of the saint), St. Giovanni in Monte, St. Giacomo Maggiore, all possessed of rich treasures of art, and St. Stephano, consisting of seven different churches, and partly dating from the 10th century. The palaces are numerous, and were formerly enriched with numerous and valuable works of art. Many of these have now disappeared, though frescoes and other internal decorations still remain. The admired fountain of the Piazza del Nettuno is adorned with a Neptune in bronze, by John of Bologna; in the Piazza Vittorio Emanuele is an equestrian statue of Victor Emanuel II. The leaning towers, Degli Asinelli, and Garisenda, dating from the 12th century, are among the most remarkable objects in Bologna. The former is square and of massive brickwork, built in three portions, and diminishing in diameter to the top. Its height is 321 feet, and its inclination from the perpendicular 4 feet. The Garisenda is 163 feet high, and inclines about 10 feet. Bologna is famous for macaroni, sausage, liqueurs, and preserved fruits. The pilgrimage to the Madonna di S. Luca, whose church is situated at the foot of the Apennines, three miles distant from Bologna, and to which an arcade of 640 arches leads, annually attracts a great number of people from all parts of Italy. This and other places in the environs may be reached by steam tramway.

Bologna was founded by the Etruscans under the name of Felsina, before the foundation of Rome. In 189 B.C. it was made a Roman colony, and called Bononia. On the fall of the Roman empire, it was taken by the Longobards, then it passed into the hands of the Franks, and was made a free city by Charlemagne. In the 12th and 13th centuries it was one of the most flourishing of the Italian republics; but the feuds between the different parties of the nobles disturbed the stable government of the city, and led to its submission to the papal see, and incorporation in the states of the Church, in 1506. Several attempts were made to throw off the papal authority, one of which, in 1831, was for a time successful. In 1849 the Austrians obtained possession of Bologna, and made it the headquarters of their 2d Italian Corps. In 1860 Bologna was by popular vote annexed to the dominions of King Victor Emanuel. Pop. about 166,000.

Bologna Phial, a small flask of unannealed glass, which flies into pieces when its surface is scratched by a hard body or a sharpened body dropped into it. It is prepared by the glass-maker as a test of the condition of a pot of metal before he fashions it into bottles or glasses.

Bolo'gna Stone, or **Bologna Phosphorus**. See **BARium** and **BARITE**.

Bolom'eter ("ray-measurer"), an instrument invented by Prof. S. P. Langley, secretary of the Smithsonian Institution, for detect-

BOLOR TAGH — BOLTON

ing and measuring small quantities of radiant heat. It consists essentially of a balanced Wheatstone's bridge (see **RESISTANCE, ELECTRICAL**), one of whose arms is formed by a thin strip of platinum foil, blackened to facilitate the absorption of heat. The bridge being in equilibrium, with no current passing through the galvanometer, a ray of radiant heat falling upon the platinum strip warms it slightly, thereby increasing its electric resistance, destroying the balance of the bridge, and causing an electric current to flow through the galvanometer. By comparing the current so produced with that produced by a source of heat, the intensity of the radiation of which is known, an estimate may be formed of the quantity of heat received from the body under investigation. The instrument is so delicate that it can detect a change of temperature, in the platinum strip, amounting to the hundred-thousandth part of a degree, Fahrenheit. Prof. Langley considers that it is also capable of measuring small quantities of radiant heat with an error of not more than one per cent. The bolometer was first devised for the purpose of studying the distribution of heat in the solar spectrum, and it has yielded much valuable information on this subject, especially in the infrared regions, where Fraunhofer lines exist, although they are invisible to the eye and can only be photographed with difficulty. For more extended descriptions of the instrument, see 'Proceedings of the American Academy of Arts and Sciences' (1881, Vol. XVI. p. 342); also 'Annals of the Astrophysical Observatory of the Smithsonian Institution' (1900, Vol. I.).

Bolor Tagh, *bō-lōr' tǎg*, also *Bilaur*, or *Behut Tagh*, a mountain range formerly imagined to exist in central Asia between eastern and western Turkestan, as the axis of the continent. At that point, however, there is really a lofty tableland called the Pamir.

Bolsas, a river of Mexico, which, after flowing west, enters the Pacific Ocean, 225 miles southwest of Mexico City.

Bolsec, *Jérôme Hermès*, *zhā-rōm hēr-mǎz bōl-sēc*, French writer: b. early in the 16th century; d. 1585. He became first, it is said, a monk, but subsequently embraced the doctrines of the Reformation and became a medical practitioner. After retiring to Italy, and remaining for some time at Ferrara, he repaired to Geneva, and insinuated himself into the good graces of Calvin. A quarrel afterward took place, occasioned, it is said, by the opposition of Bolsec to the doctrine of absolute election. It issued in his imprisonment and ultimate banishment from Geneva. He was driven later on also from Lausanne through the influence of Beza. He latterly returned to France, and having formally abjured Protestantism, settled as a physician in Lyons. He acquired considerable notoriety by the violence of his philippics against Calvin and Beza, in which, under the name of their Lives, he has raked together and published all sorts of scandal. This at least is the common view of Protestant writers.

Bolsena, *bōl-sā'nā*, Italy, a town on the lake of the same name; 56 miles north-northwest of Rome. In the immediate vicinity stood the ancient Volsinium, one of the most powerful of the Etruscan cities. Some remains of its temples, including several granite columns, are still in existence. The lake of Bolsena, which is

supposed to fill an ancient crater, exhales a deadly malaria during the summer season. It is about 9 miles long, 7 miles broad, and 285 feet deep. The shores are formed by finely wooded hills, presenting much beautiful scenery; it has two small islands, called Martana and Bisentina, believed once to have been floating, and it discharges its surplus waters into the Mediterranean by the Marta River.

Bolsward, *bōl'svǎrt*, Holland, a town in the province of Friesland, 15 miles southwest of Leeuwarden, at the junction of several canals, and intersected by canals crossed by numerous bridges. The parish church is said to be the largest and finest in Friesland. The trade of Bolsward consists chiefly in cattle, cheese, and butter.

Bolswert, *bōl'svǎrt*, **Boetius Adam**, called **Bolswert** after his native place in Friesland, Dutch engraver: b. about 1580; d. 1634. He was the author of many valuable engravings after designs of Bloemaert and Rubens. His younger brother, **SCHULTIUS ADAM**, rose to higher fame in the same art, especially distinguishing himself by his prints after some of the best works of Rubens and Vandyke. Both brothers practised their art at Antwerp.

Bolt Court, a residential court in London, off Fleet Street, near Saint Bride's Church, in which Cobbett and Dr. Samuel Johnson lived for some years.

Bolt-ropes, ropes used to strengthen the sails of a ship, the edges of the sails being sewn to them. Those on the sides are called leech-ropes, the others head and foot ropes.

Bolti, or **Bultē**, an edible chichlid fish of the Nile.

Bolting-cloth, a closely woven fabric, generally of silk, used for sifting flour. See **LOUR**.

Bolton, **Charles Edward**, American lecturer and writer: b. South Hadley Falls, Mass., 16 May 1841; d. East Cleveland, Ohio, 1901. He inaugurated the Cleveland Educational Bureau; lectured extensively in the United States and Canada; and was mayor of East Cleveland in his latest years. He published: 'A Few Civic Problems'; 'A Model Village' (1901).

Bolton, **Charles Knowles**, American poet and miscellaneous writer, son of Mrs. Sarah Knowles Bolton: b. Cleveland, Ohio, 14 Nov. 1867. He has been librarian of the Boston Athenæum Library from 1898. He has written: 'Gossiping Guide to Harvard'; 'Saskia, the Wife of Rembrandt'; 'The Wooing of Martha Pitkin'; 'Love Story of Ursula Wolcott'; 'The Private Soldier Under Washington' (1903).

Bolton, **Henry Carrington**, American scientific writer: b. New York, 1843; d. Washington, D. C., 17 Nov. 1903. He graduated at Columbia University and studied abroad; became professor of chemistry and natural science at Trinity College, Hartford, Conn. In 1900 he was elected president of the Chemical Society of Washington, D. C. He wrote: 'The Counting-Out Rhymes of Children, a Study in Folk-Lore' (1888); 'Literature of Manganese'; 'Students' Guide in Quantitative Analysis'; 'The Evolution of the Thermometer, 1592-1743' (1900).

Bolton, **Sarah Knowles**, American author: b. Farmington, Conn., 15 Sept. 1841. She married Charles E. Bolton (q.v.), lecturer and

BOLTON — BOMBARDIER

philanthropist, and resides in Cleveland, Ohio. She is the author of a number of books, including: 'Girls Who Became Famous' (1886); 'Famous American Authors' (1887); 'Famous American Statesmen' (1888); 'Famous Types of Womanhood' (1892); 'The Inevitable and Other Poems' (1895); 'Our Devoted Friend, the Dog' (1901); etc.

Bolton, Sarah Tittle, American poet: b. Newport, Ky., 18 Dec. 1815; d. Indianapolis, 4 Aug. 1893. She is known for her patriotic and war poems, including 'Paddle Your Own Canoe'; 'Left on the Battlefield'; etc. Her collected 'Poems' appeared in 1865 and 1886.

Bolton, or Bolton-le-Moors, a manufacturing town of Lancashire, England, 10 miles northwest from Manchester. It consists mainly of two divisions, Great Bolton and Little Bolton, separated from each other by the river Croal. The older portion of the two contains many narrow and irregular streets, but by far the larger portion of the town is modern. About \$2,500,000 has been recently expended in street improvements. The finest of the public edifices is the town-hall, in the Grecian style, with a tower 220 feet high, fronting a spacious square, and erected at an expense of about \$1,000,000. Among other public buildings are one of the finest market-halls in England, costing, with its approaches, nearly \$500,000; a church institute; a temperance-hall; commodious baths; savings-bank; two theatres; two technical schools; a post-office, gas offices, county court, infirmary and children's hospital; orphanages; Chadwick and Mere Hall museums; board schools; poor-law offices, etc. The religious edifices are numerous, and some of them of fine architectural appearance. Foremost among these is St. Peter's parish church, a modern cruciform building in the Decorated style, with a tower at the western end 150 feet high. The schools are numerous and well attended, and, under the school board, education is rapidly improving. There is a free grammar-school, founded in 1641. The Bolton Free Public libraries (six in number) contain over 93,000 volumes. There are now four parks, and three recreation grounds belonging to the town. In manufacturing industry Bolton is surpassed by few places in the kingdom, the cotton manufacture being its staple. It contains some of the largest and finest cotton mills in the world. In the town itself there are some 370 factories, of which nearly 140 are cotton mills and establishments for the weaving of cotton fabrics. The yarns spun in Bolton are generally fine, and a great variety of fancy goods are produced, besides plain calicoes. Bleaching is also carried on to a great extent, there being over 20 bleaching grounds, some of them very large. There are also several large engineering works, employing a great many hands. Besides these there are collieries, paper mills, foundries, chemical works, and various other works. Bolton is of considerable antiquity, having been raised to the dignity of a market-town in 1256. It returns two members to Parliament.

Bolton Abbey, a famous English Abbey in Yorkshire; in a highly picturesque district on the river Wharfe, six miles east of Skipton, and 21 miles northwest of Leeds. Founded for Augustinian canons about 1150; it has been celebrated by Wordsworth in 'The White Doe of

Rylstone' and 'The Force of Prayer.' The eastern end is a ruin, but the nave is utilized for the purposes of a parish church.

Bolyai, Farkas, Hungarian mathematician: b. Bolyai 1775; d. 1856. He obtained his early education in Enged, Klausenburg, and Jena, and for three years (1796-9) studied at Göttingen. He later became professor of mathematics in the Reformed College of Maros-Vásárhely, a position which he very efficiently held for 47 years. He made several attempts to prove Euclid's postulate of parallelism, but it remained to his son to finally declare the *science absolute of space*, assigning the Euclidean geometry to a particular kind of space. His chief work, however, was known as 'Teutamen,' which later contained an appendix of 26 pages to Vol. I, called 'Scientiam Spatii Absolute Veram Exhibens,' written by his son János, and which has since become famous.

Bolzano, Bernhard, Bohemian Roman Catholic theologian and philosopher: b. Prague, 5 Oct. 1781; d. 18 Dec. 1848. From 1805 to 1820 he was professor and chaplain at the University of Prague, but was accused of insidiously instilling into the minds of the students the heresies of Schelling and Hegel, and was dismissed from his office. He left many writings, of which his 'Wissenschaftslehre' (1842) is the most important. Consult 'Autobiography' (1875).

Bomarsund, a narrow channel between the islands of Aland and Vardö, at the entrance of the Gulf of Bothnia. The Russian fortifications to the harbor of Bomarsund were destroyed by the British and French fleets during the war of 1854. The channels leading up to Bomarsund were blockaded at the end of July by four British ships and a few small steamers. Shortly afterward strong detachments of the allied fleets arrived, with the admirals Napier and Parseval-Deschênes, followed, 7 August, by the line-of-battle ships with Gen. Baraguay d'Hilliers and 12,000 troops, mostly French. The Russian commander, Gen. Bodisco, was compelled to surrender on 16 August, the allies continuing to occupy the island until the end of the month, when the whole of the fortification was blown up. The trophies of the victors were 112 mounted guns, 79 not mounted, 3 mortars, 7 field guns, and 2,235 prisoners. The principal military interest offered by this siege is its setting at rest the question of the employment of uncovered masonry in fortifications with land-fronts.

Bomb, a hollow, cast-iron ball or shell, filled with gunpowder, or other combustible, and exploded by means of a time-fuse, being commonly thrown from a mortar. Instead of spherical bombs, elongated shells fired from rifled guns are now in general use. See also AMMUNITION; PROJECTILES.

Bomb Lance, a harpoon used in whale fishing which carries a charge of explosive material in its head. In one form of the weapon the arrangement is that when the harpoon strikes the fish, the bar, which is pivoted obliquely in the head of the instrument, shall serve to release a spring acting on the hammer, which then explodes the cap and bursts the charge chamber.

Bombard. See BOMBARDMENT.

Bombardier, originally an artillery soldier whose special duties are connected with the loading and firing of shells, grenades, etc., from

BOMBARDIER-BEETLE—BOMBAY

bombards, mortars, or howitzers. Bombardier is now the special title of a non-commissioned officer in the British artillery ranking with a corporal.

Bombardier-beetle, or Artillery-beetle, an insect of the genus *Brachinus*, and family *Carabida*. The head is narrow, the prothorax heart-shaped. While certain other beetles have at the end of the body two glands which secrete a malodorous fluid which they eject as a means of defense against their enemies, in the bombardier-beetle this fluid or spray appears to be charged with a gas, which, on coming in contact with the air, looks like smoke, and is ejected with an explosion like that of a miniature pop-gun. This gas-like vapor and detonation baffles and discomfits the pursuer (most often some other predatory beetle) as if blinding it. When being captured they will fire off this discharge several times. Several of the species (*B. fumans* and allies) are yellowish-red, with bluish and greenish elytra.

Bombardment, the act of throwing bombs or shells into a town or fortress for incendiary purposes. A bombardment is either desultory, when ships, field batteries, or a proportionately small number of siege batteries, throw shells into a place in order to intimidate the inhabitants and garrison into a hasty surrender, or for some other purpose; or it is regular, and then forms one of the methods of conducting the attack of a fortified place. The attack by regular bombardment was first introduced by the Prussians in their sieges in 1813, after Waterloo, of the fortresses in the north of France. The army and the Bonapartist party being then much dispirited, and the remainder of the inhabitants anxiously wishing for peace, it was thought that the formalities of the old methodical attack in this case might be dispensed with, and a short and heavy bombardment substituted, which would create fires and explosions of magazines, prevent every soul in the place from getting a night's rest, and thus in a short time compel a surrender, either by the moral pressure of the inhabitants on the commander, or by the actual amount of devastation caused, and by out-fatiguing the garrison. The regular attack by direct fire against the defenses, though proceeded with, became secondary to vertical fire and shelling from heavy howitzers. In some cases a desultory bombardment was sufficient, in others a regular bombardment had to be resorted to; but in every instance the plan was successful; and it is now a maxim in the theory of sieges, that to destroy the resources, and to render unsafe the interior of a fortress by vertical fire, is as important (if not more so) as the destruction of its outer defenses by direct and ricochet firing. A bombardment will be most effective against a fortress of middling size, with numerous non-military inhabitants, the moral effect upon them being one of the means applied to force the commander into surrender. Before bombarding a town, it is customary to give 24 hours' notice thereof, to allow women, children, and non-combatants to leave it. Modern bombardments have not usually been particularly destructive. During the siege of Paris, 1870-71, some 500

shells were thrown into the city by the Germans, but relatively little mischief was accomplished by them. A similar result was shown at the bombardment of Santiago de Cuba by the American forces in 1898, and also in the long sieges of Ladysmith and Kimberley in 1899-1900. See also **SIEGE**.

Bombardon, a large brass musical instrument of the sax-horn kind, and the lowest of these instruments. It is made in more than one size, and the largest is generally of circular form and big enough to go round the body of the performer. It is not capable of very rapid execution.

Bombastes Furioso, a burlesque opera by William Barnes Rhodes, produced in 1790 and intended as a parody of 'Orlando Furioso.' Its name is that of the principal personage, a braggard who kills his king, Artaxominous, for a pair of jack-boots.

Bombax (**SILK COTTON TREE**), a genus of 10 or 12 tropical trees of the natural order *Malvaceæ* with digitate leaves and large scarlet or white axillary flowers. *B. ceiba*, the five-leaved silk cotton tree, attains a great height in tropical America, where it is native and where its immense trunks are scooped out for canoes. This species, *B. munguba*, another South American species, and *B. malabaricum*, the red silk cotton tree, so named from the color of its "cotton," bear pods which furnish a fibre useful for stuffing cushions; hence the common name. All the species yield useful bast employed in rope making, and have been suggested as possibly valuable for paper making.

Bombay, a presidency of British India, stretching along the west side of the peninsula, and bounded on the land side by Baluchistan, the Punjab, Rajputana, native states of the Central India Agency, the Central Provinces, Berar, Haidarabad, Madras, and Mysore; and on the west by the Arabian Sea. The divisions are: Sind, the least populous, Gujerat, the most populous, Deccan, Konkan, and Karnatik. The presidency also includes many feudatory states. The chief towns are Bombay, Poona, Ahmedabad, Surat, and Karachi. The chief spoken languages are Marathi, used by nearly half the population; Gujrathi, used by the commercial classes; Kanarese, and Sindhi. About three fourths of the population profess Hinduism, fully one sixth are Mohammedans, the rest being Jains, Christians, Sikhs, Parsees, aborigines, etc.

The chief openings in the coast of Bombay are the gulfs of Cambay and Cutch, separated by the peninsula of Kathiawar. The chief harbors are those of Bombay and Karachi. The river Nerbudda which enters the Gulf of Cambay, divides the province into two physically distinct parts. North of it are Gujerat and Sind, with the peninsulas of Cutch and Kathiawar, mostly a fertile alluvial plain. Much of Sind, however, is a desert, crossed by low sand-hills. South of the Nerbudda, the province presents a narrow flat strip of coast, rising inland toward the upland country of the Western Ghats and the Deccan. The chief mountain ranges are the Hala Mountains, west of the Indus, the Western Ghats, running north and south, and the Satpura range, separating the basins of the Nerbudda

BOMBAY—BOMBON

and the Taptee. The most important rivers are the Indus, Nerbudda, and Taptee, all of which flow into the Arabian Sea; the Godavari and Kistna rise on the eastern slopes of the Ghats. Many short torrential rivers traverse the Konkan coastal strip. The forests of Sind consist chiefly of sisu, babul (a kind of acacia), bhan (a species of poplar), and tamarisk; while from the forests of the western slopes of the Ghats are obtained teak, blackwood, ebony, ironwood, babul, sandalwood, and other valuable timbers. The cocoanut and date palms, mango, jack, betel-nut, and myrobalans are other important indigenous vegetable products. Among the wild animals are the maneless lion of Gujerat, the wild ass, leopard, tiger, black bear, bison, antelopes, and venomous snakes. The climate varies greatly from one district to another, two extremes being represented by Upper Sind, with great heat and little rain, and the Konkan, with excessive rainfall, especially from June to October. The chief agricultural productions are cotton, rice, millet, wheat, barley, dates, the cocoa-palm, oil-seeds, sugar, and indigo. The area of the presidency under British administration is 124,122 square miles. Pop. of British portion of the presidency about 19,000,000, and of the native states, 7,000,000. See Drew, 'Bombay and Its Feudatories' (1892); Douglas, 'Glimpses of Old Bombay and Western India' (1900). The growth of cotton in Bombay received a great impetus during the American Civil War; and although the great demand did not prove lasting, cotton continues to be a highly important crop, part of the produce being exported, and a considerable portion of it worked up in the cotton-mills of Bombay. The total number of pupils receiving education at primary and other schools amounts to about 750,000, of whom only about one eighth consist of females. The annual revenue largely exceeds the expenditure, and latterly has amounted to about \$75,000,000.

Bombay, a city and seaport on the west coast of India, capital of the presidency of the same name, situated at the southern extremity of the island of Bombay, and connected with the mainland and the interior by extensions of the Bombay and Baroda, and the Great Indian and Peninsula Railways, the terminus of the latter being a splendid edifice which cost \$15,000,000. Extensive waterworks have been constructed on the mainland, including a dam two miles in length, and were opened in 1892. The town comprises two main portions, one known as the Fort, and formerly surrounded with fortifications, on a narrow point of land with the harbor on the east side and Back Bay on the west; the other known as the City, a little to the northwest. The European population live partly in the Fort quarter, but mostly in villas surrounded with extensive areas, called compounds, in various parts of the island. Bombay has many handsome buildings, both public and private, and a number of fine streets, the latter being in many cases traversed by street railways. The castle, the government offices, and almost all the merchants' warehouses and offices are in the Fort. On the esplanade facing southwest

is a fine range of public buildings, including the secretariat, the new high court, the offices of the public works department, the post and telegraph offices, etc. There are a cathedral and several other churches in Bombay, which is the see of an Anglican bishop. There are also some fine hotels. In 1859 a university was opened. Various industries, such as dyeing, tanning, and metal working, are actively carried on, and there are now nearly 100 cotton-mills. The commerce of the port is very extensive, by far the greater portion of the exports and imports of the presidency passing through Bombay. The chief article of export is raw cotton, the chief import cotton piece goods, the commerce being chiefly with Great Britain. The harbor is one of the largest and safest in India; while its scenery and that of the neighboring continent presents a rare combination of grandeur and beauty. It is situated between the islands of Colabah, Bombay, and Salsette on the one hand, and the mainland and islands of Caranjah and Elephanta on the other. There are large and commodious docks, the ships and basins being calculated for vessels of any size. There is a large traffic with steam vessels between Bombay and Great Britain, and regular steam communication with China, Australia, Singapore, Mauritius, etc. A railway between Bombay and Tannah, on the island of Salsette, 20 miles distant, opened in 1853, was the first Indian railway constructed. Pop. about 775,000. The island of Bombay is about 11 miles long from north to south, and about three miles broad, formed by two ranges of rock running parallel to each other on opposite sides of the island. The interior was formerly liable to be overflowed by the sea, to prevent which substantial walls and embankments were constructed.

Bombay was obtained by the Portuguese in 1530 from an Indian chief at Salsette; by them it was ceded to Great Britain in 1661, and in 1668 it was transferred to the East India Company. Next to Madras it is the oldest of the British possessions in the East, and from the commencement of the last century has gradually increased in importance.

Bombay Duck. See BUMMALOTI.

Bombazine, derived from *bombyx*, the Greek term for silk and silkworm, is a mixed tissue of silk and worsted, and was long woven both plain and colored. The latter, however, has gone into disuse, and the only color now used is black, for which there is an extensive demand in Spain and South America, where some of the religious orders use it, and it generally forms the material of the almost universally worn Spanish *mantilla*. The manufacture was originally introduced into England by a colony of Dutch or Flemings, who settled in Norfolk, and long continued to have its principal seat at Norwich, the capital of that county, though it is now chiefly confined to Halifax and Kidderminster.

Bombon, Philippines, a large, fresh water lake in the island of Luzon, about 50 miles south of Manila. It is 105 square miles in area. There is a small island in the centre, from which rises the volcano Taal, whose height is only 850 feet. The waters of the lake find an outlet to the sea through the Pansipit River.

BOMBAY.



VICTORIA RAILWAY STATION.

Bombproof, a structure intended to resist or repel artillery shot and shell. When designed for permanency they are either of masonry or cut from solid rock, but temporary bombproofs are constructed of earth and timber, or other available material. See also **BLINDAGE**.

Bombycidae, a group of genera comprising some of the largest and most regal of moths. Their thick, heavy bodies and small sunken heads, the mouth parts often obsolete, the tongue either wholly or partly atrophied; the broadly pectinated antennæ; the broad, often falcate, wings; and their sluggish habits, afford good characters for distinguishing them. The larvæ are silk-worms, or "spinners." They are often thick, usually more hairy or spiny than those of other groups of moths, or as in the Chinese silk-worm, smooth; while in the large *Attacus ablas*, *Telea polyphemus*, *Samia cecropia* and *Tropæa luna*, the worms are short, fat, fleshy, and sluggish. They spin a more or less dense cocoon of silk to protect the enclosed pupa from sudden changes in the weather. Although the name *Bombycidae* is confined to the small group represented by the silk-worm (*Bombyx mori*), all the typical spinners are referred to as bombycine moths. The most typical families are the *Notodontida*, *Sphingicampida*, *Saturniida*, and *Remileucida*. Of these the *Sphingicampida*, however, like the *Sphingida*, to which they may have given origin, spin no cocoon and transform in the earth, the pupa being subterranean (see also **SILKWORM**). Consult: Packard, 'Monograph of the Bombycine Moths' ('Memoirs of the National Academy of Sciences,' Vol. VII., Washington, 1895).

Bomford, George, American soldier: b. New York, 1780; d. Boston, Mass., 25 March 1848. He graduated at West Point in 1805 and was assigned to the Engineer corps. Between 1805 and 1812 he worked on the fortifications of New York harbor, the defenses of Chesapeake Bay, and was superintending engineer of the works on Governor's Island. During the War of 1812 he was brevetted lieutenant-colonel for distinguished service in the ordnance department. He introduced bomb cannons, made on a pattern of his own invention, which were called Columbiads, a kind of heavy gun combining the qualities of gun, howitzer, and mortar. On 30 May 1832 he was appointed chief of ordnance, and on 1 Feb. 1842 became inspector of arsenals, ordnance, arms, and munitions of war, in which duty he continued until his death. See Cullum, 'Officers and Graduates of the United States Military Academy' (Vol. I. 1868).

Bon Marché, bôn mār-shā, one of the large department stores of Paris, situated on the Rue de Bac and Rue de Sèvres. It was founded in 1853 by Aristide Boucicault as a small store in the Rue de Bac and grew little by little to be the great establishment it now is. The present building was begun in 1869, was first used in 1872, and has been enlarged at various times since then. The management is co-operative. Pensions from \$120 to \$300 a year are given to men after the age of 50, and women after 45, and there is a regular system of promotion. It is thought that this organization has contributed largely to the success of the store.

Bona, Giovanni, Italian cardinal: b. Mondovì, Piedmont, 10 Oct. 1609; d. Rome, 27 Oct. 1674. He was renowned for his piety and learning, a collaborator in the 'Acta Sanctorum,' the author of 'Rerum Liturgicarum,' which is an authority on the service of mass, and of 'De principiis vitæ Christianæ,'—a book which has frequently been compared to the 'Imitation of Christ,' and of which a French translation has appeared (1854-5).

Bona Dea, the good goddess, a mysterious divinity of the Roman mythology, the wife or the daughter of Faunus. Her worship was secret, performed only by women; men were even required to ignore her name. Her sanctuary was in a cavern in the Aventine Hill, but her festival, which occurred 1 May, was celebrated in a separate room in the dwelling of the consul who then had the fasces. No man was allowed to be present, and all male statues in the house were covered. The wine used at this festival was called milk, and the vessel in which it was kept, *mellarium*. After the sacrifices, bacchanalian dances were performed. According to Juvenal, licentious abominations marked these festivals. The snake was the symbol of the goddess, and this would point to her being considered as possessing a curative, medical power, and in her sanctuary various herbs were offered for sale. By the Greeks the Bona Dea was identified with Hecate, Semele, or other divinities.

Bona Fide, a technical legal expression, to which the law of Great Britain and this country has annexed a certain idea. It is a term used in statutes in England and in acts of the legislature of all the United States, and signifies a thing done really, with a good faith, without fraud or deceit, or collusion or trust. The words *bona fide* are restrictive, for a debt may be for a valuable consideration and yet not *bona fide*. A debt must be *bona fide* at the time of its commencement or it can never become so afterward. If a contract be made with good faith, subsequent fraudulent acts will not vitiate it, although such acts may raise a presumption of antecedent fraud and thus become a means of proving the want of good faith in making the contract.

Bonacci-Brunamonti, Maria Alinda, mǎ-ē'ā ā-lēn'dā bō-nā'chē-broo-nā-mōn'tē, Italian poet: b. Perugia, 1842. She was only 14 years old when her first 'Collection of Poems' appeared and attracted much attention. Her 'National Songs' (1859-78) were inspired by Italy's struggle for freedom.

Bonald, Louis Gabriel Ambroise, loo-ē gā-brē-ēl an-brwāz bō-nāl (VICOMTE DE, vē-cōnt dē), French philosopher: b. 1754; d. 1840. During the Revolution he joined the Royalist army under the Bourbon princes. He returned to France under Napoleon; became co-editor of the *Mercure* with Chateaubriand and Fiévée, and in 1808 was appointed minister of public instruction. After the Restoration,—as the deputy for his department,—he voted with the Ultramontane or Theocratic party in the Chambre Introuvable, and in his political career, as in his philosophical works, was the ardent advocate of absolutism, of the infallibility of the Pope, and of the Jesuits. In 1830 he refused to take the oath of allegiance to the new dynasty.

BONANNO — BONAPARTE

Bonanno, bō-nān'nō, Italian architect and sculptor. In 1174 he commenced, with Wilhelm of Innsbruck, the famous Leaning Tower of Pisa. He was also the designer of the celebrated bronze doors of the cathedral of that city.

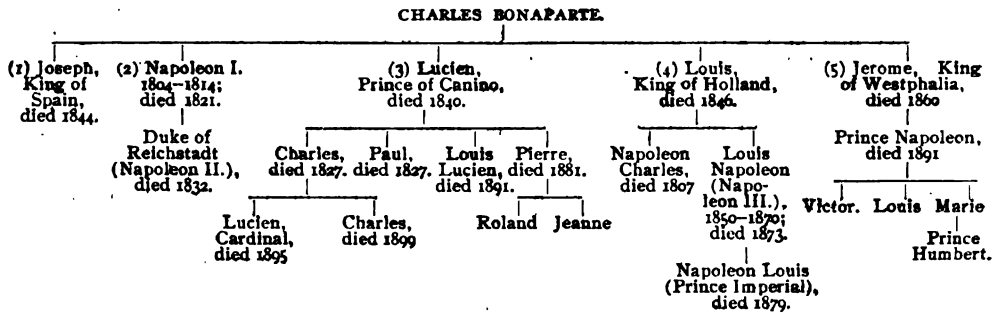
Bonanza, a rich body of ore. See COMSTOCK LORE.

Bonaparte, or **Buonaparte**, the name of a Corsican family—a name now as well known as any in history. It was spelt Buonaparte by the Emperor Napoleon and his father till 1796, though the more usual, modern form also occurs in old Italian documents. Several families are mentioned as early as the 12th century who bore the name of Bonaparte, and who took a position of some prominence in the history of Italy. In 1122, for instance, a Bonaparte was banished from Florence as a Ghibelline. Corrado Bonaparte is mentioned in 1170 and Jacopo Bonaparte in 1210 as knights of the Order of the Golden Spur. The office of *podestà* was held by Nordio Bonaparte in Parma in 1272, by Pietro Bonaparte in Padua 1285, and by Giovanni Bonaparte in Florence 1333. In 1250 a Bonaparte was syndic of Ascoli, and in 1440 Cesare Bonaparte was chosen as head of naval affairs at Sarzana. A

of Ajaccio in the senate of Genoa; and in 1614 Francesco was chosen captain of his native town. In 1757 Joseph, the grandfather of Napoleon I., received a formal patent of nobility from the Grand Duke of Tuscany. About the middle of the 18th century there remained three male representatives of the family of Bonaparte at Ajaccio, the archdeacon Lucien Bonaparte, his brother Napoleon, and their nephew Charles, who became father of the Emperor Napoleon I. and of a numerous family of princes.

Bonaparte, Charles, father of the Emperor Napoleon I. b. Ajaccio, Corsica, 29 March 1746; d. Montpellier, 24 Feb. 1785. He was carefully educated, studied law at Pisa, and soon after his return married without the consent of his relatives Letitia Ramolino, a beautiful patrician. He fought under Paoli for the independence of Corsica, but resistance to the French proving useless he went over to their side. In 1771, when Louis XV. caused 400 Corsican families to be selected who alone were to be considered noble, the Bonaparte family,—and consequently Charles,—was among the number. By the influence of the French governor, Marbœuf, who was very friendly toward the family,

THE BONAPARTE FAMILY (*Male Issue*).



Giovanni Bonaparte is said to have married a niece of Pope Nicholas V. in 1404, but this seems doubtful for chronological reasons. It is however certain that about 1454 Niccolo Bonaparte was ambassador of this Pope to several courts, and vicar of the Holy See in Ascoli. Another Niccolo Bonaparte, professor at San Miniato in the 16th century, is stated to have been the author of the comedy 'La Vedova' (Florence 1568); and a work on the Sack of Rome in 1527 is attributed to the Tuscan Giacomo or Jacopo Bonaparte, who was an eyewitness of the event. The connection between these different Bonapartes is by no means well established; yet in 1771 the relationship of the Corsican Bonapartes with the Florentine Bonapartes was judicially recognized. In Corsica itself a Messire Bonaparte appears as witness to an act executed by Berengar II. of Italy as early as 947, and it is therefore not improbable that the family originally emigrated from this island to the mainland, and that a branch of the Genoese line returned to their old home in the 16th century. From the time of Gabriel Bonaparte, who settled at Ajaccio in 1567, and took part in the naval expeditions against the Moors, the Bonapartes ranked as a patrician family of that town. In 1576 Girolamo Bonaparte was elected deputy

he was (1773) named royal councilor and assessor for the town and province of Ajaccio. As a member of the deputation of Corsican nobles sent to the court of France in 1777 he resided several years at Paris, and was fortunate enough to secure a free admission for his eldest son, Joseph, to the seminary at Autun, another for his second son, Napoleon, to the military school of Brienne, and a third for his daughter, Maria Anna, to the educational institution at St. Cyr. He returned to Corsica in 1779, and afterward went to Montpellier for the benefit of his health, but did not recover. By his marriage with Letitia Ramolino he left eight children; Joseph (see BONAPARTE, JOSEPH), king of Spain; Napoleon I., emperor of the French (see NAPOLEON I.); Lucien (see BONAPARTE, LUCIEN), prince of Canino; Maria Anna, afterward called Elise, princess of Lucca and Piombino, and wife of Prince Bacciocchi (see BACCIOCCHI, FELICE PASQUALE); Louis (see BONAPARTE, LOUIS), king of Holland; Carlotta, afterward named Marie Pauline, Princess Borghese (q.v.); Annunciata, afterward called Caroline, wife of Murat (see MURAT), king of Naples; and Jerome (see BONAPARTE, JEROME), king of Westphalia. See also BONAPARTE, LETITIA RAMOLINO; NAPOLEON III.

BONAPARTE

Bonaparte, Jerome, youngest brother of Napoleon: b. Ajaccio, Corsica, 15 Nov. 1784; d. near Paris, 24 June 1860. At an early age he entered the French navy as a midshipman. In 1801 he was sent out on an expedition to the West Indies, but the vessel being chased by English cruisers, was obliged to put in to New York. During his sojourn in America, Jerome Bonaparte became acquainted with Miss Elizabeth Patterson, the daughter of the president of the Bank of Baltimore, and a descendant, as is asserted, of "Old Mortality," immortalized by Sir Walter Scott. His addresses to this young lady having been accepted, they were married 24 Dec. 1803, according to the Roman Catholic ritual, in the cathedral of Baltimore, and in 1805 embarked for Europe. This marriage of his brother did not meet the approval of the Emperor Napoleon, whose ambitious views it thwarted, and he accordingly, after an ineffectual application to Pope Pius VII. to have it dissolved, issued a decree declaring it to be null and void. On 12 Aug. 1807, Jerome was married to Catherine Sophia, Princess of Württemberg, and a few months afterward was created king of Westphalia, and crowned with great pomp at Cassel, 1 Jan. 1808. His government was not marked by much judiciousness or prudence; little regard was paid to national feelings, and the finances of the state, both from mismanagement and the frequency of hostile incursions, became ere long involved in hopeless embarrassment. The battle of Leipsic put an end to Jerome's reign, and he was obliged to take flight to Paris. On the conclusion of the Treaty of Paris he left France, and proceeded first to Switzerland, thence to Grätz, and in the beginning of 1815 to Trieste. On his brother's return from Elba he again proceeded to Paris, and was nominated a peer of France. At the battles of Ligny and Waterloo he was actively engaged, and displayed considerable bravery, besides receiving a wound in the arm. On Napoleon's overthrow he retired first to Switzerland, then to Württemberg, and from this period up to the fall of Louis Philippe, in 1848, resided in different parts of Europe under the title of the Comte de Montfort, and latterly chiefly in Florence. On the outbreak of the revolution of February 1848 he returned to Paris, and was appointed (23 December) governor-general of the hospital of the Invalids, and in 1850 a marshal of France. In 1852 he was made president of the Senate. Reference has already been made to the two successive marriages contracted by Jerome Bonaparte. From his union with Miss Patterson only one son proceeded, Jerome (see BONAPARTES OF BALTIMORE). By his second wife Jerome Bonaparte had three children. The elder son, JEROME BONAPARTE, b. 1814, d. 1847 MATHILDE BONAPARTE, Princess of Montfort (b. Trieste, 27 May 1820), married the Russian Count Anatol Demidoff, and lived at the court of Louis Napoleon during his presidency. The younger son, NAPOLEON JOSEPH CHARLES PAUL BONAPARTE, commonly known as PRINCE NAPOLEON (b. Trieste, 9 Sept. 1822; d. 18 March 1891), passed his youth in Italy; entered the military service of Württemberg in 1837; afterward traveled in several countries of Europe; and was banished from France (1845) on account of his intercourse with the Republican party. After February 1848 he was elected to the National Assembly. He commanded an in-

fantry division at the battles of Alma and Inkermann. In 1859 he married the Princess Clotilde, daughter of Victor Emmanuel, by whom he had two sons (see BONAPARTE PRETENDERS), and a daughter. After the fall of the empire he took up his residence in England, but returned to France in 1872. On the death of the Prince Imperial, son of the Emperor Louis Napoleon, in Zululand in 1879, the eldest son of Prince Napoleon became the heir of the Bonapartist hopes. When, in 1886, the chiefs of the Bourbon family were, by a vote of both chambers, expelled from France, Prince Napoleon and his eldest son were exiled also as pretenders to the throne.

Bonaparte, Joseph, eldest brother of Napoleon I.: b. Corte, Corsica; d. Florence, Italy, 28 July 1844. He was educated in France at the college of Autun, returned to Corsica in 1785 on his father's death, studied law, and in 1792 became a member of the new administration of Corsica under Paoli. In 1793, after Paoli had called in English aid, he emigrated to Marseilles, and became brother-in-law to Bernadotte, afterward king of Sweden, by marrying one of the daughters of a wealthy banker named Clari. In 1796 he accompanied the army of Italy as commissary, in 1797 was elected a Corsican deputy to the Council of Five Hundred, and shortly after was sent by the Directory ambassador to the Pope. He returned abruptly, and had not long resumed his seat in the Council of Five Hundred, when his brother having become First Consul he was made counselor of state, and employed to negotiate a treaty with the United States. Shortly after, in 1801, he negotiated the peace of Luneville with the emperor of Germany, and in 1802 that of Amiens with Great Britain. Napoleon having now begun to deal out kingdoms among his family, Joseph was made king of Naples and Sicily in 1806, but had reigned only two years when his brother recalled him, and sent him to Madrid to be king of Spain and the Indies. His seat at Naples had not been comfortable, and he now found himself on a bed of thorns. His kingship lasted nominally for five years, but he was chased once and again from his capital, and the third time, in 1813, fled not to return. In these appointments Joseph was merely a tool in his brother's hands. In 1814, after the fatal expedition to Russia, Napoleon on setting out for the army made him lieutenant-general of the empire, and head of the council of regency. This was his last office of any consequence. After the battle of Waterloo he sailed for the United States and lived for some years at Bordentown, N. J., where he employed himself in agriculture, and was highly esteemed by his neighbors. During his exile he assumed the title of Count de Survilliers. In 1832 he went to England and after residing there for some time repaired to Italy, and spent his closing days in Florence. His wife appears to have been prevented by ill health from accompanying him to the United States. She survived her husband but a few months. There were two daughters. The eldest became the wife of the eldest son of Lucien Bonaparte, and the second was married to the second son of Louis Bonaparte.

Bonaparte, Letitia Ramolino, mother of Napoleon, and hence known by the name of **MADAME MÈRE**: b. Ajaccio, Corsica, 24 Aug.

BONAPARTE

1750; d. Rome, 2 Feb. 1836. She was married in 1767 to Charles Bonaparte (see BONAPARTE, CHARLES). Left a widow in 1785, she continued to reside in Corsica till 1793, when she removed to Marseilles. In this city she lived in straitened circumstances. After her son became First Consul, she fixed her residence at Paris, had a separate establishment assigned to her, and lived in considerable state, though somewhat retired. All things considered, she conducted herself with great discretion, performing her part becomingly in the station to which she had been so unexpectedly elevated, and yet never allowing herself to forget that in the necessary course of events the sudden rise of her family might one day be terminated by an equally sudden fall. When the fall came she retired to Rome, and collecting most of the surviving members of her family around her, lived to the very advanced age of 86.

Bonaparte, Louis (COUNT OF ST. LEU), second younger brother of the Emperor Napoleon I., and father of Napoleon III.: b. Ajaccio, Corsica, 2 Sept. 1778; d. Leghorn, Italy, 25 July 1846. He was educated in the artillery school at Chalons, accompanied Napoleon to Italy, and afterward to Egypt, but without distinguishing himself in any special manner. He subsequently rose to the rank of a brigadier-general, and in 1802 married Hortense Eugénie Beauharnais, Napoleon's step-daughter (see BEAUHARNAIS, HORTENSE EUGENIE). In 1806, on Schimmelpenninck, grand pensionary of Holland, demitting his office, Louis Bonaparte was compelled by his brother, notwithstanding his protestations, to accept the Dutch crown. The difficult situation in which he was placed rendered it impossible for him to be anything else than a mere viceroy of Napoleon; but to his credit it must be recorded that he exerted himself to the utmost in promoting the welfare of his new subjects, and resisted as far as in him lay the tyrannical interference and arbitrary procedure of France. With all his efforts, however, he found himself unable to restore the finances of the country to a healthy condition: a quarrel took place between him and his brother relative to the continental system maintained by the latter, which had proved most injurious to Dutch commerce, and he ultimately, on 1 June 1810, abdicated the sovereignty, and retired to Grätz under the title of the Count of St. Leu. Holland was thereupon annexed to France. In 1814 Louis paid a visit to Paris, and strongly counseled his brother to make peace with the allies. After the Restoration he took up his abode at Rome, and separated himself from his wife, Hortense, a disunion which continued throughout his life. In 1826 he removed from Rome to Florence, and from thence, a short time after his son's escape from the fortress of Ham, to Leghorn, where his literary abilities were considerable, and he was the author of a novel entitled '*Marie, les Peines de l'Amour ou les Hollandaises*'; and '*Documents historiques et Réflexions sur le Gouvernement de la Hollande*'; etc.

Bonaparte, Lucien (PRINCE OF CANINO), next younger brother of Napoleon I.: b. Ajaccio, Corsica, 21 March 1775; d. Viterbo, Italy, 29 June 1840. He emigrated to Marseilles in 1793, and made himself conspicuous as a hot-headed Republican by addressing clubs, and publishing

bombastic pamphlets. Shortly after, having been appointed to a situation in the commissariat at the small town of St. Maximin in Provence, he married the innkeeper's daughter. He made a narrow escape during the Reign of Terror, and in 1796 was appointed commissary at war, and on his election as a member of the Council of Five Hundred, took up his residence in Paris. He joined the opposition in the council, and seconded Sieyès and his party, who wished to frame a new constitution. He is said to have written to his brother in Egypt complaining of the incapacity of the executive Directory, and urging his return; and in 1799, when the council wished to outlaw Napoleon, Lucien, who was president, after manfully resisting the motion, slipped quietly out of the chair in the confusion, and sent in the soldiers, who cleared the hall. The revolution thus mainly accomplished by his decisive procedure led to the establishment of the consular government, and Lucien was a member of the commission which framed its constitution. Afterward appointed minister of the interior, he was active in the encouragement of education, art, and science, and organized the prefectures. As ambassador to Madrid (1800) he contrived to gain the confidence of King Charles IV. and his favorite, Godoy, and to undermine the British influence, which had until then been exercised at the court of Spain. On his return to Paris in 1802 he was member of the tribunate, and then a senator, and having lost his first wife, married a stockbroker's widow. This marriage, and other concurring causes, appear to have given deep offense to Napoleon, and in the enactment fixing the succession to the crown, while Joseph and Louis were named eventual heirs, Lucien and Jerome were not mentioned. The crowns of Italy and Spain were offered Lucien on condition of his divorcing his wife, but he refused them and chose a retired life, devoting himself to art and science. He fixed his residence at Rome, where he appears to have gained the good graces of Pius VII., who created him, in 1814, Prince of Canino. During Napoleon's haughty treatment of the Pope, Lucien had freely expressed his displeasure, and apparently despairing of a reconciliation with his brother, or perhaps not caring to ask it, he embarked for the United States in 1810, but had not proceeded far when he was captured by a British cruiser and carried to Malta. Ultimately he was brought to England, and allowed to reside on parole at a place in the vicinity of Ludlow Castle. Here he employed much of his time in writing a poem entitled '*Charlemagne ou l'Eglise Sauvée*,' which he afterward published with a dedication to Pius VII. After the battle of Waterloo his brother appointed him his extraordinary commissioner to the chamber of deputies. He showed no lack of zeal in endeavoring to arouse a feeling of sympathy, but found the attempt vain, and left matters to take their course. He afterward returned to Italy. Besides the poem '*Charlemagne*,' which has been translated into English, and published in 2 volumes 4to, he wrote another, called '*La Cynéide ou la Corse Sauvée*,' and an autobiography, which, under the title of '*Mémoires*,' was published during his lifetime.

By his first wife, Lucien had two daughters; by his second, nine children. His eldest son, CHARLES LUCIEN JULES LAURENT BONAPARTE, Prince of Canino and Musignano: b. Paris, 24

BONAPARTE PRETENDERS—BONAPARTES OF BALTIMORE

May 1803; d. 29 July 1857, achieved a considerable reputation as a naturalist, chiefly in ornithology. He published a continuation of Wilson's 'Ornithology of America' (1825-33); the 'Iconografia della Fauna Italica' (1832-41); his *chef d'œuvre*, 'Catalogo Metodico degli Uccelli Europei' (1842); 'Catalogo Metodico dei Pesci Europei' (1845); 'Ornithologie Fossile' (1858); and a number of other valuable works on zoology, and was a member of the leading natural history societies in Europe and America. During the later years of his life he took a prominent part in Italian affairs as a supporter of the Liberal party. PAUL MARIE BONAPARTE, the second son, b. 1808, took a part in the Greek war of liberation, and died by the accidental discharge of a pistol in 1827. The third son, LOUIS LUCIEN BONAPARTE (b. Thorn Grove, England, 1813; d. 1891), early devoted himself with equal ardor to chemistry, mineralogy, and the study of languages, and became an authority of the first rank in Basque, Celtic, and comparative philology generally. His election for Corsica in 1848 was annulled, but he was sent to the Constituent Assembly for the Seine department next year, and was made senator in 1852, with the title of highness in addition to that of prince, which he already possessed from his birth. The total number of separate books written either by himself or at his instigation and encouragement, amounted to no less than 222. Among these are a translation of St. Matthew's version of the parable of the sower into 72 languages and dialects of Europe (1857); a linguistic map of the seven Basque provinces, showing the delimitation of the "Euscara," and its division into dialects, sub-dialects, and varieties (1863); a Basque version of the Bible in the Labourdin dialect (1865); a treatise on the Basque verb (1869); besides many papers of profound learning in the philological journals. A great work produced under his patronage from 1858 to 1860, was a version of the Song of Solomon in 22 different English dialects, besides four in Lowland Scotch, and one in Saxon. He lived long in England, where a Civil List pension of \$1,250 was granted to him in 1883. The fourth son, PIERRE NAPOLEON BONAPARTE (1815-83), passed through many changes of fortune in America, Italy, and Belgium, and returned to France in 1848. In 1870 he shot a journalist, Victor Noir, a deed which created great excitement in Paris; and, being tried, was acquitted of the charge of murder, but condemned to pay \$5,000 to Victor Noir's relatives. He died in 1881. The youngest son, ANTOINE BONAPARTE (b. 1816), fled to the United States after an affair with the papal troops in 1836, and returned to France in 1848, where he was elected to the National Assembly in 1849.

Bonaparte Pretenders. Of the Emperor Napoleon I. and his brothers, Joseph and Louis, male issue is now extinct. The emperor's brothers, Lucien and Jerome, are represented by the following living descendants, and they constitute the present imperialist house of France:

PRINCE VICTOR NAPOLEON (of the house of Jerome): b. 18 July 1862, is the son of the late Prince Napoleon and the Princess Clotilde, sister of King Humbert of Italy. The Prince has been recognized by his party as the undisputed head of the Bonaparte family. He lives in Brussels and is unmarried. His only brother,

Prince Louis Napoleon, born in 1864, is an officer in the Russian army. His sister, born in 1866, is the widow of Prince Amadeus of Italy, by whom she had a son, Prince Humbert, born in 1889.

PRINCE CHARLES NAPOLEON, brother of the late Cardinal Bonaparte, who died 12 Feb. 1899, was the last representative of the eldest son of Napoleon's brother, Lucien, in the male line. He was born in 1839; was married and had two daughters—Marie, wife of Lieut. Giotti, of the Italian army, and Eugénie, unmarried. He had three sisters, married, respectively, to the Marquis of Roccagivoino, Count Primoli, and Prince Gabrelli.

PRINCE ROLAND BONAPARTE is the only living male cousin of Prince Charles Napoleon. He is a son of the late Prince Pierre Napoleon Bonaparte (1815-81); was born in 1858; married in 1880, the daughter of Blanc, the proprietor of the Monte Carlo gambling establishment. His wife died in 1882, leaving him a daughter and a fortune. He has one sister, Jeanne, born in 1861, and married to the Marquis de Villeneuve.

Bonapartes of Baltimore, the branch of the family residing in Baltimore, Md., and derived from the marriage of Jerome Bonaparte, brother of the Emperor Napoleon I., with Elizabeth Patterson, daughter of William Patterson, an eminent merchant in the city of Baltimore. Elizabeth was born 6 Feb. 1785, and was scarce 18 years of age, when Jerome Bonaparte in command of a French frigate landed in New York in 1803. She, at that time, was distinguished by uncommon personal beauty, and is said, moreover, to have strikingly resembled the Bonaparte family. The fame of Napoleon insured for his brother Jerome a distinguished reception in America, and wherever he went he was most hospitably entertained. On visiting Baltimore he saw Miss Patterson, and soon became much attached to her, a partiality which she readily returned, and being ambitious in her views of life, she at once accepted his offer of marriage, and was united to him 24 Dec. 1803. The marriage ceremony was performed by the bishop of Baltimore, John Carroll, brother of Charles Carroll of Carrollton, the signer of the Declaration of Independence, and in accordance with the ritual of the Roman Catholic Church. The marriage contract, considered of importance, was drawn up by Alexander J. Dallas, subsequently secretary of the treasury, and witnessed by several official personages, including the mayor of Baltimore. Jerome Bonaparte remained in America for a full year, visiting, with his wife, various parts of the country. They embarked for Europe in the spring of 1805, in the American ship Erin, and arrived safely at Lisbon. The news of the marriage proved very distasteful to the dictator of France, partly because Jerome had dared to marry without his consent, and partly on account of his own wish to unite all his brothers to European princesses. Before the newly wedded pair could reach Europe, an order went forth to every port under French authority, forbidding them to land. The hopes of the fair American were now forever blighted, as Napoleon sternly refused to recognize her marriage. Jerome left her at Lisbon, and hastened to Paris, hoping by a personal interview to soften the emperor, directing the vessel to proceed to Amsterdam, as the state of his wife's health would

not admit of her undergoing a long land journey, even if a passport could be obtained for her, which was very doubtful. On the Erin's arrival at Texel roads, Madame Bonaparte found that an order had been awaiting her coming, which prohibited her from landing. She was obliged to sail at once for England, where she established her abode, and at Camberwell, near London, gave birth to a son. She never saw her husband again, except in a casual meeting many years after their separation. Jerome, who was originally much attached to his wife, in vain petitioned the emperor to recognize her, and was finally obliged to marry the Princess of Würtemberg. After the downfall of Napoleon, Madame Patterson (as she was styled for a long period) visited Europe, and is said to have encountered Jerome Bonaparte with his wife in the gallery of the Pitti palace in Florence. On meeting, Jerome started aside, and was overheard to say to the princess: "That lady is my former wife." He instantly left the gallery, and next morning departed from Florence. Napoleon I. never succeeded in inducing Pope Pius VII. to declare Jerome's first marriage null and void. Madame Bonaparte, after the birth of her son, generally resided in Baltimore, in the possession of abundant wealth. Notwithstanding her treatment by Napoleon, she always expressed the highest admiration for him, and prophesied that her grandson would eventually succeed him as emperor of the French. JEROME NAPOLEON, son of the preceding: b. Camberwell, England, 7 July 1805; d. Baltimore, 17 June 1870. His mother returned to the United States during his boyhood, and he was raised in Baltimore. He entered Harvard College, and graduated from that institution in 1826. He studied for the bar, but never practised law. He was married to Miss Susan Mary Williams, daughter of Benjamin Williams, originally of Roxbury, Mass. Miss Williams was a lady of very large fortune, which, united with Bonaparte's own property, made him one of the wealthiest citizens of Baltimore. After his marriage he devoted his time to the management of a large estate, and partly to agricultural pursuits. For many years, Bonaparte received a handsome allowance from his father, with whom he was on terms of intimacy in his several visits to Europe. During the reign of Louis Philippe, Bonaparte was permitted to sojourn in Paris, but for a short period only, and under his mother's name of Patterson. Although traveling *incognito*, he attracted much attention from his singular likeness to the great emperor. He was thought to resemble him more than any of the monarch's own brothers did. He was on good terms with Napoleon III., and visited the French court with his son, by the invitation of the emperor. Bonaparte tested his legal standing in the French courts by lodging a claim to share with the offspring of the second marriage, in the property of his father; but judgment was given against him. JEROME NAPOLEON, grandson of Jerome Bonaparte: b. Baltimore, 5 Nov. 1832; d. Pride's Crossing, Mass., 4 Sept. 1893. He was educated at Harvard College and West Point Military Academy, but resigned his commission in the United States army to enter the French service in 1854. He served with distinction in the Crimean war and in the Italian campaign. CHARLES JOSEPH, grandson of Jerome Bonaparte: b. Baltimore, 9 June 1851.

He was graduated from Harvard University in 1871 and the Harvard law school in 1874. In 1904 he was appointed a member of the Board of Indian Commissioners. In 1905 he was appointed Secretary of the Navy by President Roosevelt and on 17 Dec. 1906 became Attorney-General.

Bonar, Horatius, Scotch hymnist: b. Edinburgh, 19 Dec. 1808; d. 31 July 1889. He wrote 'Hymns of Faith and Hope,' many of which have been taken into the hymnals of most of the Protestant churches. He also wrote more than 20 volumes on theological and religious subjects.

Bonasone, Giulio, jool'ē-ō bō-nā-sō'nā, Italian painter: b. Bologna, 1510; d. 1574. He studied under Marcantonio Raimondi, but did not equal his master in execution. Although best known by his engravings, which reproduce the works of Raphael, Michael Angelo, and Guilio Romano, specimens of his paintings are to be found in the churches of his native city.

Bonasus, a species of wild ox, the aurochs (q.v.).

Bonaventure, Saint (properly JOHN OF FIDANZA), Italian philosopher: b. Tuscany, 1221; d. 1274. In 1243 (or 1248) he became a Franciscan monk; in 1253 teacher of theology at Paris, where he had studied; in 1256, general of his order, which he ruled with a prudent mixture of gentleness and firmness. At the time of his death he was a cardinal and papal legate at the Council of Lyons. His death was hastened by his ascetic severities. On account of his blameless conduct from his earliest youth, and of some miracles ascribed to him, he enjoyed during his life the greatest veneration, and was canonized by Pope Sixtus IV. The elevation of thought in his writings procured him the name of "The Seraphic Doctor." The Franciscans oppose him as their hero to the Dominican scholastic Thomas Aquinas. He wrote for the honor and improvement of his order, for the promotion of the worship of the Virgin, on celibacy, transubstantiation, and other doctrines. He is, on the whole, distinguished from other scholastics by perspicuity, avoidance of useless subtleties, and greater warmth of religious feeling. Among his writings are 'Itinerarium Mentis in Deum'; 'Reductio Artium in Theologiam'; 'Centiloquium'; and 'Breviloquium.' His whole works were published 1588-96, at Rome, in 7 folio volumes, and there are several modern editions. Many pieces attributed to him are not genuine.

Bonavis'ta, Newfoundland, the name of a bay, cape, district, and town on the east coast of the island. The greatest width of the bay is 39 miles. Its navigation is rendered dangerous by the rocky islands with which it is studded. There is a lighthouse at the entrance of the harbor. The town stands near the cape, about 70 miles north by west of St. John's, and is a port of entry and fishing station. Pop. 3,551.

Bon'bright, Daniel, American educator: b. Youngstown, Pa., 1831. He graduated at Yale (1850), and was tutor there (1854-6). Between 1856 and 1858 he studied at the universities of Berlin, Bonn, and Göttingen, and upon his return to America became professor of the Latin language and literature in Northwestern University, Evanston, Ill. From 1899-92 he was dean of the faculty of liberal arts. During 1900-2 he was acting president of the university.

Bonchamp, Charles Melchoir Artus, shārl mēl-kē-or ār-tū bōn-shān (MARQUIS DE, mār-kē dé), Vendean leader: b. Anjou, 10 May 1760; d. 17 Oct. 1793. He served as a volunteer in the American Revolutionary War, and was a captain in the French army at the outbreak of the French Revolution. A strong Royalist, he naturally disliked the Revolution, and consequently lived in retirement until chosen leader of the Anjou insurgents. In conjunction with La Rochejacquelein and Cathelineau he fought with great bravery and frequent success, but his superior knowledge of military tactics was not sufficiently made use of by the insurgent army. In the encounter at Cholet, 17 Oct. 1793, Bonchamp received a fatal shot in the breast, and when his followers vowed to revenge his death on 5,000 Republican prisoners, the dying hero exclaimed: "Spare your prisoners. I command it!" This last command was obeyed.

Bond, (Sir) Edward Augustus, English scholar: b. Hanwell, 1815. In 1867 he was placed over one of the departments of the British Museum, and in 1878 became head librarian, retaining the post for 10 years. He was one of the founders and for many years the president of the Palæological Society, editing in this connection 'Facsimiles of Ancient Manuscripts.' Among other works edited by him are 'Statutes of the Colleges of Oxford,' and 'Travels of Jerome Horsey.'

Bond, George Phillips, American astronomer (son of William Cranch Bond (q.v.)): b. Dorchester, Mass., 20 May 1825; d. 17 Feb. 1865. He assisted his father in the Harvard College Observatory, and at the time of the latter's death was appointed director. He discovered independently 11 new comets, and was the author of an elaborate memoir on the appearance of Donati's comet in 1858, and of important investigations on the subject of perturbations of cometary orbits, as well as an investigation into the theory of the constitution of Saturn's rings. His drawing of the nebula in Orion, of which a fine steel-plate engraving was made, was also remarkable work, and astronomical photography received its first impulse at his hands.

Bond, William Cranch, American astronomer: b. Portland, Me., 9 Sept. 1789; d. 29 Jan. 1859. He began life as a watchmaker, and constructed the first ship's chronometer made in the United States. He established a private observatory at Dorchester, Mass., which was at the time the finest in the country. Invited to move his observatory to Cambridge, he accepted the invitation of the Harvard College authorities, and in 1840 was appointed astronomical observer to the college, and later to the directorship of the observatory erected there in 1843-4. He was the inventor of the method of registering the beats of a clock by galvanic circuit, together with the observed transits of stars over the wires of a transit instrument, upon a chronograph, and he invented the spring governor, in which part of a train of clockwork is regulated by a pendulum with a dead-beat escapement, and the other, receiving its motion through an elastic axis, is made to run uniformly by a balance- or fly-wheel, and thus time is visibly measured to a small fraction of a second. The plan of recording observations by electro-magnetism, known in Europe as the American method was first

brought into practical working by Sears C. Walker, through Bond's assistance.

Bond. See BUILDING; MASONRY.

Bond, a written acknowledgment or binding of a debt under seal. The person who gives the bond is called the obligor, and he to whom it is given the obligee. A bond may be single, as where the obligor obliges himself, his heirs, executors, and administrators, to pay a certain sum of money to another at a day named, or it may be conditional (which is the kind more generally used) that if the obligor does some particular act, the obligation shall be void, or else shall remain in full force, as payment of rent, performance of covenants in a deed, or repayment of a principal sum of money borrowed of the obligee with interest, which principal sum is usually half of the penal sum specified in the bond. There must be proper parties, and no person can take the benefit of a bond, except the parties named therein, except, perhaps, in some cases of bonds given for the performance of their duties by certain classes of public officers. A man cannot be bound to himself even in connection with others. The bond must be in writing and sealed, but a sealing sufficient where the bond is made is held sufficient though it might be an insufficient sealing if it had been made where it is sued on. It must be delivered by the party whose bond it is to the other. But the delivery and acceptance may be by attorney. The date is not considered of the substance of a bond, and therefore a bond which has either no date or an impossible date is still valid, provided the real day of its being dated or given can be proven. The condition is a vital part of a conditional bond, and usually limits and determines the amount to be paid in case of a breach, but interest and costs may be added (12 Johns. 350). The recovery against a surety in a bond for the payment of money is not limited to the penalty, but may exceed so far as necessary to include interest from the time of the breach. So far as interest is payable by the terms of the contract, and until default made, it is limited by the penalty, but after breach it is recoverable, not on the ground of contract, but as damages, which the law gives for its violation. On the forfeiture of the bond, or its becoming single, the whole penalty was formerly recoverable at law, but here the courts of equity interfered, and would not permit a man to take more than in conscience he ought, that is, his principal, interest and expenses in case the forfeiture accrued by non-payment of money borrowed, the damages sustained upon non-performance of covenants, etc. And the similar practice having gained some footing in the courts of law, the statute of 4 and 5 Anne, C. 16, at length enacted, in the same spirit of equity, that in case of a bond conditioned for the payment of money, the payment or tender of the principal sum due with interest and costs, even though the bond were forfeited and a suit commenced thereon, should be a full satisfaction and discharge. (2 Bl. Com. 340.) If in a bond the obligor binds himself without adding his heirs, executors, and administrators, the executors and administrators are bound, but not the heir (Sheppard's Touchstone, 369) for the law will not imply the obligation upon the heir. (Coke,

BONDAGE — BONE

Litt. 209a.) If a bond lie dormant for 20 years it cannot afterward be recovered; for the law raises a presumption of its having been paid, and the defendant may plead *solvit ad diem* to an action upon it. (1 Burr. 434; 4 Burr. 1963.)

Bondage. See VILLENAGE.

Bonded Warehouse, a place where taxable imports of manufactures may be left in government custody, under bond for payment of the duty, till the importer or manufacturer is prepared to make full payment of duty. The system was designed to promote commerce and certain manufactures by lessening the pressure on the importer or manufacturer by means of instalment payments of duty.

Bonders, a class of independent landholders in Norway and Sweden. They are at once peasants and aristocrats, being descended from the old leaders, and sometimes from the princes, of the nation, yet being also cultivators of the soil, and more rude than the farmers of America or the yeomen of England. They number seven ninths of the whole population, and are the principal electors of representatives to the National Assembly, in which their power predominates over that of the nobles and clergy.

Bondi, bôn'dē, Clement, Italian poet: b. Mizzano, Parma, 27 June 1742; d. Vienna, 20 June 1821. Joining the Jesuits shortly before the suppression of the order in Italy, he was appointed professor of eloquence in the University of Parma. He afterward provoked the hostility of the order by publishing an ode in praise of their suppression, and was obliged to seek an asylum in the Tyrol, where the Archduke Ferdinand took him under his protection, appointed him his librarian at Brunn, and entrusted him with the education of his sons, one of whom afterward succeeded to the duchy of Modena. In 1816 Bondi was appointed professor of history and literature at Vienna, and died there. He was an easy and elegant versifier, and cultivated with success almost all the varieties of poetry — lyric, didactic, satirical, and elegiac. Among the most important are 'La Giornata Villereccia,' 'La Conversazione,' and 'La Felicità.' He also executed a metrical version of the *Æneid*, which some consider his best work.

Bondman, The, one of Hall Caine's best-known romances, abounding in action and variety. The action turns upon the blind attempts of a young man at doing new wrongs to revenge old ones, which are overruled by Providence for good; and at the last, no longer against his will but by the development of his own nature, he fulfills his destiny of blessing those he has sworn to undo.

Bondu, bôn-doo, a country of West Africa, belonging to the French territory of Senegal, on the west of the Falémé, a tributary of that river. Its length is about 115 miles, its breadth about 100. Its surface is but little diversified, and the land as a whole is not very fertile, nor is the climate good. The ordinary African animals occur, but the lion is becoming scarce. The ass is the chief domestic animal. The population, which consists of Fulahs and other tribes, is rather sparse, having been reduced by

frequent wars, but under French rule is beginning to increase. Agriculture, manufactures, and commerce are alike unimportant.

Bone, or Bona (the *APHRODISIUM* of Ptolemy), a seaport of Algeria, province of and 86 miles north-northeast of Constantine. Pop. about 35,000, among whom there are about 12,000 French and 10,000 Italians. It is built at the foot of a hill, and is surrounded by a wall nearly two miles in circumference. It is the seat of French judicial courts. The streets are narrow and crooked, but many of the houses are substantial and well built, and the town has been greatly improved since it came into the hands of the French in 1832. It possesses a college, schools, Roman Catholic cathedral, a convent of the Sisters of Mercy, hospital, etc. There is a good market, and also reading-rooms, coffee-houses, and a theatre. The chief manufactures are burnouses, tapestry, and saddles. It exports corn, iron ore,alfa, wine, wool, hides, wax, oil, honey, etc.; and its trade is considerable. There is regular steamboat communication between Bona and Marseilles. About one mile south of the town are the remains of Hippo Regius.

Bone, the compact hard material making up the skeleton of mammals, most of the birds, reptiles, and amphibians, and the bony fishes. It is also found in some lower forms. Chemically bone is complex. It is essentially organic substances, 30 to 35 per cent infiltrated with inorganic mineral salts, 65 to 70 per cent; to the former its toughness is due and to the latter its hardness. The organic substances of bone are ossein (collagen, gelatin), small quantities of elastin, proteids and nuclei from the cells and small quantities of fat. The inorganic salts are calcium carbonate, calcium phosphate, calcium fluoride, magnesium phosphate, calcium chloride, and small quantities of sulphates and other chlorides. The percentages of both inorganic and organic constituents vary widely in the bones of different animals, and also in the different bones of the same animal. These differences vary widely if the age varies, but are fairly constant for the same animal of the same age. Thus the amount of water may vary from 13 to 45 per cent in the different bones of the human body, being greater in amount in the spongy bones and less in the compact bones, and as the bones grow older the percentage of water diminishes. In the living body many of the bones, particularly the ribs, and the heads of all the long bones, contain a substance termed marrow. This is an important substance in the human economy, being the source of much of the blood-building material. In soups this marrow makes one of the most important factors. This bone marrow is pervaded by a network of white fibrous connective tissue and in the meshes are contained the cells, myeloplaxes, that make many of the blood corpuscles, particularly the polymorph neutrophiles, and the eosinophiles. In the red marrow the red corpuscles are developed. The bone marrow is very rich in proteids, nucleo-proteids, extractives, globulins, fats, and compounds of iron. Prepared bone marrows are therefore highly nutritious, and the modern "grilled bone," which is usually rich in marrow, is a toothsome and valuable dietary addition. The histological structure of bone is very intricate;

BONE BLACK

in the young developing animal, cartilage first makes its appearance from modified connective tissue cells. In this cartilage certain points of ossification appear, which subsequently develop bone and the bone from several points coalesces to make the completed bone structure. The bone cells in the cartilage, the osteoblasts, thicken and form a distinct cell wall in which the inorganic salts are deposited and osteoblast by osteoblast the structure of bone is made up. Bone is also formed by the periosteum, which is a covering, first of the cartilage and then of the developing bone. Bony tissue contains arteries, veins, nerves, and lymphatics, and is a distinct tissue, largely modified by the deposition of mineral salts. In a section across a long bone, at its centre, say the thigh bone, femur, there is on the outside the thin tough layer, the periosteum with its vessels and nerves and lymphatics; within this is the compact bone and in the centre the cavity usually filled with marrow at the ends. A very thin section of the compact bone viewed under the microscope shows a number of cavities, the Haversian canals; these contain blood vessels or were the sites of former blood vessels in the developmental stage. Around these Haversian canals, one sees regular lamellæ, not unlike the rings about a tree trunk; these are the Haversian lamellæ and indicate the regular growth of bone cells from the centre. Scattered between the lamellæ are numerous small spaces, containing living bone cells, the lacunæ, all of which are probably in communication with one another by minute canals, or canaliculi. Thus the entire bony system is pierced throughout by an extremely fine and exceedingly rich network of canals. As these are filled with lymph the bone substance is constantly bathed in this living life-giving fluid. The different bones of the body show minor variations in structure. The bones of the human body are grouped according to their shape, as long bones, flat bones, short, and irregular bones. They approach one another at the joints, where they are protected by cartilages, smooth synovial membrane, and bathed in a synovial fluid. The long bones consist of a shaft and two expanded ends or epiphyses, and are found in the limbs. They give support and leverage for motion and are usually slightly curved in one or two directions to give greater elasticity. Flat bones are found in the skull, pelvis, scapula, and are usually so disposed as to afford protection to the internal viscera; they also offer considerable surface for muscular attachment and hence give a good leverage for the long bones. Short bones are found in the wrist and ankle. Strength and freedom of motion are their attributes. Irregular and mixed bones, are the vertebræ and some of the bones of the skull. They each have varied and specially adaptive functions. Many bones, especially those of the skull, are composite. They develop separately, and finally unite. Thus the bones of the skull are separated until late in life, and in some individuals, some of the bones never develop thoroughly. This is frequently the case in the growth of the lower jaw, where failure to unite produces the well-known deformity of cleft palate or hare lip.

Bone is slightly heavier than water, its specific gravity varying from 1.80 to 1.90. The spongy bones, because of the large amount of

air contained, float in water. The bones of birds are remarkable for their strength and lightness. The twofold nature of bones is readily demonstrated by two simple experiments. If one bone is placed in acid, 20 per cent hydrochloric, the acid will attack and dissolve out the mineral salts, after which the bone may be bent and its shape altered at pleasure, nothing but the organic material remains; another similar bone may be placed in a furnace and the heat will burn out the organic matter entirely; that which remains will be the mineral matter. It will retain the shape of the original bone, will be white, but will break down into powder at the least pressure.

Uses of the Bones.—In dietetics bones make a substratum for soups. These are important carriers of salts to the body. As for the gelatine alone, it is a tissue sparer, the body can not use it for purposes of anabolism, but it spares katabolism of proteids. It is a useful menstruum for foodstuffs. Bone marrow is highly nutritious, contains iron, and is a superlative food, and thought to be particularly valuable as a blood maker. The uses of bone in the arts are numerous. (See FERTILIZERS.) Consult Syminowitch, 'Histology'; Gray, 'Anatomy.' See ANATOMY; KINETOGENESIS; OSTEOLOGY.

Bone Black, Ivory Black, or Animal Charcoal, the black carbonaceous substance into which bones are converted by calcination or destructive distillation in close vessels, and which is extensively used in the process of sugar-refining. This application of it is due to the property which it possesses in common with other kinds of charcoal, but in a superior degree, of depriving various kinds of solutions, syrups, etc., of their coloring matters, and thus blanching or purifying them. Animal charcoal is prepared either by heating the bones in a retort similar to that in which the coal is decomposed in gas-works, or, which is the better plan, in small cast-iron pots piled up in a kiln. The pots are placed above each other with their mouths in contact, the mouths being luted together with loam. Two of the pots together hold about 50 pounds of bones, which should previously be freed of all fatty, fleshy, and tendinous matters, as the quality of the charcoal is in this case improved. The bones lose, on the average, about half their weight in the process of calcination. The charcoal is ground between grooved rollers in order to prevent the formation of dust, and by this means it is reduced to the condition of coarse grains varying from the size of turnip-seed to that of peas. Liquids are decolorized by passing them through a filter or bed of thin granular charcoal, which absorbs by mechanical action the coloring matters held in solution. The filtering beds used in sugar-refining are sometimes of the depth of 50 feet. After the liquor has flowed for a certain time the charcoal becomes completely saturated, and its purifying action ceases. It has then to be restored so that it may be used again, and this is effected by various means, such as washing with water or with weak hydrochloric acid, long exposure to air and moisture, or heating to redness. The last is the best method, and is the one almost invariably adopted, the charcoal being heated in iron pipes, fire-clay chambers, or in rotating cylinders. See CHARCOAL, ANIMAL.

BONE-CAVES—BONHAM

Bone-caves, caverns containing deposits in which are embedded large quantities of the bones of animals (many of them extinct), dating from the Pleiocene or later geologic periods. See CAVE.

Bone Diseases. See OSTEOMYELITIS; PERIOSTITIS; OSTEITIS.

Bone-dog. See BONE-SHARK; DOGFISH.

Bone-dust, bones ground to dust to be used as manure. See FERTILIZERS.

Bone-fish. See LADY-FISH.

Bone-shark, or **Basking-shark**, a comparatively rare species of pelagic shark, found in the Arctic seas, and southward as far as Portugal and New York. It obtains the name "bone-shark" from the resemblance of its slender, long and close-set gill-rakers to whale-bone. It is also known as "basking-shark," because of its habit of remaining quiet for hours in one place. It reaches a length of 40 feet, and its skin is rough and covered with small spikes. It is usually seen in the brooding season, sluggishly swimming in groups, on the surface of the water, and undisturbed by the approach of boats.

Bonebreaker, the great fulmar-petrel (*Ossifraga gigantea*) of the islands and coasts of the South Pacific and Atlantic oceans. It is as large as an albatross, and feeds mainly upon the carcasses of dead seals and cetaceans, whose bones it is capable of breaking with its vulture-like beak.

Boner, John Henry, American poet and literary worker: b. Salem, N. C., 31 Jan. 1845. A contributor to the magazines, he was on the editorial staff of the 'Century Dictionary' and the 'Standard Dictionary,' and was at one period literary editor of the *New York World*. He has written 'Whispering Pines' (1883), a volume of verse.

Boner, Ulrich, ool'rih bō'nér, the most ancient German fabulist, a Dominican friar at Bern, in the first half of the 14th century. His collection of fables under the title 'Der Edelstein' (the Gem), is distinguished by purity of language and picturesque simplicity of description. The first editions of these fables were by Bodmer and Eschenburg. Benecke published a very good edition with explanatory notes and an excellent vocabulary (1816); that of Pfeiffer appeared in 1844, and a recent imprint is found in Reclam's 'Universal Bibliothek' (1895).

Boneset, or **Thoroughwort** (*Eupatorium perfoliatum*), a stout, ill-smelling perennial herb of the natural order *Compositæ*, native of America, common in moist soil. The plants, which attain a height of sometimes eight feet, are often planted as ornamentals in low ground. In midsummer when the profusion of purplish or white flowers are in full blow they are striking objects. The foliage and flowers have been used as a tonic in domestic medicine, their intensely bitter taste being supposed to commend them for this purpose. See EUPATORIUM.

Bonet, Juan Pablo, hoo-an' pāb'lō bō-nēt', Spanish teacher of the deaf and dumb of the 17th century, distinguished as one of the first teachers of this class, and the author of a remarkable work 'Reduccion de las letras y artes para enseñar a hablar a los mudos,' published

in Madrid, 1620. It explained his method of instruction, containing the first alphabet for the deaf and dumb, and was of good service to Dalgarno, Wallis, and, a century later, to the Abbé de l'Épée, who acknowledged his indebtedness to Bonet's labors.

Bonfiglio, or **Buonfiglio**, Benedetto, bā-nā-dēt'tō bōn-fē'lyō, Italian painter: b. 1425 (?); d. 1490 (?). His chief work was the frescoes of the Palazzo Comunale at Perugia, where he lived. These frescoes placed him in the first rank of the painters of the Umbrian school. It is believed that he also assisted Pinturicchio in decorating the Vatican.

Bong'abong, Philippines, a town in the southeast part of Luzon, with an estimated population of 20,000. It lies in a mountainous district, and attained military importance as the headquarters of a regiment of United States troops. The town has a municipal government based upon popular election.

Bongar, bōn'gār, a serpent of the genus *Bungarus*. See KRAIT.

Bonghi, Ruggero, rood-jā'rō bōn'gē, Italian scholar and publicist: b. Naples, 21 March 1826; d. near Naples, 22 Oct. 1895. The commencement of his brilliant career indicated scholarly activities only, for he made fine studies and versions of Aristotle and Plato; but latterly he took up such subjects as 'The Financial History of Italy, 1864-8' (1868); 'The Life and Times of Valentino Pasini' (1867), and 'The Life of Jesus' (1890); 'The Roman Festivals' (1891); the popularity and value of these and other works giving him great prominence. He held professorships in several Italian universities; was minister of public instruction in 1874-6; was a member of the Chamber of Deputies nearly continuously from 1860; founded the *Stampa*, the leading Turin journal, and the magazine 'Cultura,' of which he was editor at the time of his death; and presided over the International Peace Congress held in Rome in 1891.

Bon'go, or **Obongo**, the name of a negroid people in the basin of the Ogowe River, in the French Congo. They live by the chase, grazing, and agriculture, and are skilful workers in iron.

Bongo, a large west African bushbuck (q.v.).

Bonham, Milledge L., American lawyer and soldier: b. Edgefield, S. C., 25 Dec. 1813; d. White Sulphur Springs, N. C., 27 Aug. 1890. He graduated at South Carolina College, 1834, was admitted to the bar, 1837, and served as a representative in Congress 1840-4. In 1836 he was major and adjutant-general of the South Carolina Brigade in the Seminole war in Florida; and colonel of the 12th U. S. Infantry during the Mexican war. In 1856 he was elected to Congress as a State Rights Democrat, and re-elected in 1858, but left Congress 21 Dec. 1860, when the South Carolina delegation withdrew. Commissioned a brigadier in the Confederate army, 19 April 1861; he commanded Beauregard's centre at the first battle of Manassas, but gave up his commission to enter the Confederate Congress, 27 Jan. 1862. He was governor of South Carolina 1862-4, when he was again commissioned a brigadier-general, and was serving with Gen. Johnston

at the time of the latter's surrender. In 1868 he was a delegate to the National Democratic convention in New York.

Bonham, Texas, a town and county-seat of Fannin County, situated on the Texas & P. and the Denison, B. & N. O. R.R.'s. It is the seat of Carlton College, and the Masonic Female Institute. As the centre of an agricultural region it has a large export trade, especially in cotton. Its chief manufacturing industries are flour mills, cotton-gins, machine-shops, carriage and wagon factories, tobacco factories, etc. Pop. (1910) 4,844.

Bonheur, François Auguste, frän-swä ä-güst bö-nër, French painter, brother of Rosa Bonheur: b. Bordeaux, 4 Nov. 1824; d. 23 Feb. 1884. The beauty of his landscapes has been much praised. He was made Chevalier of the Legion of Honor in 1867 and received numerous medals.

Bonheur, Jules Isadore, zhül ez-ä-dör bö-nër, French painter and sculptor, brother of Rosa Bonheur (q.v.): b. Bordeaux, 15 May 1827. In the Salon of 1848 he exhibited both paintings and sculpture but in later years confined himself to sculpture. Medals were awarded him in 1865 and 1867. Among noted works of his are 'The Zebra and Panther'; and 'The Tiger Hunter.'

Bonheur, Marie-Rosa, mä-re rö'za bö-nër, French artist of distinction, widely known as a painter of animals: b. Bordeaux, 22 March 1822; d. Fontainebleau, 25 May 1899. She received her earliest instruction in art from her father, and when only 18 years old exhibited two pictures, 'Goats and Sheep,' and 'Two Rabbits,' which gave clear indications of talent. In 1849 a fine work, 'Labourages Nivernais,' by her, was purchased by the French government for 3,000 francs and placed in the Luxembourg collection. In 1855 'The Haymaking Season in Auvergne' was hung at the Universal Exposition in Paris, and in the same year she sent the 'Horse Fair' to the French Exhibition in London, where it was the centre of attraction for the season. It was offered by her to Bordeaux for \$6,000, but the offer being declined it was sold in England for \$20,000. It was subsequently purchased by Cornelius Vanderbilt for the Metropolitan Museum in New York. She made a quarter size replica which is now in the National Gallery in London. After this work she stood at the very head of delineators of animal life, showing a wonderful power of representing spirited action. Near her studio she had an ante-chamber as a stable for the convenient study of animals, of which she collected some noble specimens. She also attended horse markets and fairs; generally wearing masculine dress, which was not unbecoming to her strong and marked features. After 1849 she directed the Free School of Design for Young Girls in Paris. During the siege of Paris the crown prince of Prussia especially ordered that her studio and residence at Fontainebleau should be spared and respected. She received a first-class medal at the French Salon in 1849, and another in 1855; and the decoration of the Legion of Honor in 1865; was made a member of the Institute of Antwerp in 1868; received the Leopold cross from the king of Belgium in 1880, and the same year received from the king of Spain the Com-

mander's Cross of the Royal Order of Isabella the Catholic. In 1892 a celebrated painting by her, entitled 'Horses Threshing Corn,' was sold for \$60,000. It is the largest animal picture ever painted, showing 10 horses large as life. In 1896, on her 74th birthday, she furnished a painting representing the historical combat between two stallions to which Lord Godolphin invited his friends in 1734. See Larnelle, 'Rosa Bonheur, sa vie et ses œuvres' (1885); Peyrol, 'Rosa Bonheur: Her Life and Works'; Stranahan, 'A History of French Painting' (1899).

Bonhomme, Jacques, zhäk bö-nöm, a term of contempt used by the French nobility to designate the common people, especially the peasants.

Bonhomme Richard, the flagship of John Paul Jones (q.v.), in the most remarkable naval victory on record, 23 Sept. 1779; originally the Duras, a worn-out unseaworthy merchant Indian assigned to him by the French government because none of their own naval officers would serve under a foreigner, and renamed by Jones from Franklin's 'Poor Richard,' because he obtained her by following one of its maxims. She had 21 guns on a side, mainly 12-pounders, with three 18-pounders aft near the water line; and a mongrel crew of Americans, British, Portuguese, and other classes. With three other vessels in the squadron Jones intercepted, off Flamborough Head, on the east coast of England, a British fleet of naval stores from the Baltic, convoyed by the Serapis (Capt. Richard Pearson) and the Countess of Scarborough. The latter was captured by one of Jones' squadron; the former about 7 o'clock on a moonlight night joined battle with the Richard, having 25 guns on a side, 10 18-pounders—a much greater weight of metal than its foe, and with far more penetrating power than the 12-pounders of the American ship. To neutralize this advantage Jones' policy was to fight at close range; and in the attempt to rake the Serapis the two vessels swung broadside to and were lashed together by Jones, and fought the rest of the battle so close that the guns could not be run out full length, their muzzles touched, and the rammers of each had to be thrust into the port-holes of the other to load. Only those of the starboard side of each could be used. Two of Jones' 18-pounders burst at the first fire; his lighter guns were gradually silenced by the Serapis; the entire sides of his vessel were shot away, so that the Serapis' shot passed through without touching anything; she caught fire in several places; she had been leaking at the outset, and now had several feet of water in the hold; and an under-officer in affright let the 200 or 300 British prisoners loose and ran to tear down the colors, but finding the flag-pole gone began to shriek for quarter. Lieut. Dale with immense presence of mind set the prisoners at the pumps, not only saving a guard but releasing the pumpmen to fight; Jones broke the officer's head with a pistol-butt, and in answer to Pearson's inquiry if he was ready to surrender, replied, "I have not begun to fight yet," though the Serapis was firing heavily and his own guns were nearly still. Meantime, however, the deadly musket fire from the Richard's top gear had made the service of the upper guns of the Serapis almost sure death, and they too were silenced; a cannon-shot

BONI — BONIFACE

brought down her mainmast; the combustibles thrown from the Richard wrapped her upper deck in fire; at last a bucket of hand-grenades flung down her hatchways set off a mass of cartridges strewn along the decks, killing or wounding nearly all those around, and wrecking five guns; and just then Jones' ship, the Alliance—whose timid, half-insane French captain had been tacking about, occasionally firing grape-shot at random into both vessels, came near, and Pearson struck his colors, though four of his guns were still firing and his ship was sound. Jones put Dale aboard the Serapis, and tried to navigate the Richard to a friendly port; but at 9 o'clock of the 25th she had to be abandoned, and she sank about an hour later.

Boni, *bō'ne*, a district in the island of Celebes, and one of the principal states of the Bugis nation, with an estimated area of about 1,000 square miles. This territory is mountainous, but, though contiguous to the great volcanic belt of the archipelago, exhibits no traces of volcanic action. Lompoo-Batang (great pillar), its highest peak, and the loftiest in Celebes, attains an elevation of 8,200 feet above the level of the sea. Lake Labaya, or, as called by the natives, Taparang-Danau, in the northwest corner of this territory, is a beautiful sheet of water, 24 miles long and 13 broad, with an average depth of six fathoms, and abounds in fish. It is bordered on all sides by a luxuriant and richly diversified tropical growth, except at the mouths of the numerous little streams that empty into it, where clearings, and beautiful, picturesque little villages, attest the industry, skill, and civilized tastes of the Bugis people. Boni was formerly the most powerful state in Celebes, but since 1859 has been practically a Dutch dependency. In the north the scenery is fine, and the soil fertile—rice, sago, and cassia being produced. The inhabitants have an allied language to the Macassars, with a literature of their own. Their towns and villages dot the coast, and as enterprising merchants and sailors the Bugis are found in every port of the East Indian Archipelago; they also engage in agriculture and in the manufacture of cotton and articles of gold and iron, in which they have a large trade. They are well built, active, and brave, and are lighter skinned, as well as superior in honesty and morality to other Malay races. Their institutions, said to be very ancient, partake of the character of a constitutional monarchy. The British have twice attacked the Bonese for injuring their commerce, and selling the crews of British ships into slavery. In the second attack, in 1814, the Bonese king was killed. The number of the population is unknown, estimated from 200,000 to 300,000.

Boni'face, *Saint*, the apostle of Germany, who first preached Christianity: b. Crediton, England, 680; d. Dokkum, West Friesland, 5 June 755. His original name was Winfrid. In the Cloister school at what is now Exeter he received his first lessons in secular and religious training and at the age of 18 he entered the Benedictine monastery in Southamptonshire and shortly after received the habit of Saint Benedict. In his 30th year he was consecrated a priest. A great part of Europe at this period was inhabited by heathen peoples, and several missionaries set

out from England and Ireland to convert them. Among these was Boniface, who in 718 went to Rome, where Gregory II. authorized him to preach the gospel to the nations of Germany. He commenced his labors in Thuringia and Bavaria, passed three years in Friesland, and journeyed through Hesse in Saxony, baptizing everywhere, and converting the pagan temples to Christian churches. In 723 he was invited to Rome, made a bishop by Gregory II., and recommended to Charles Martel and all princes and bishops. His name Winfrid he changed to Boniface. He destroyed the oak sacred to Thor, near Geismar, in Hesse, founded churches and monasteries, invited from England priests, monks, and nuns, and sent them to Saxony, Friesland, and Bavaria. In 732 Gregory III. made him archbishop and primate of all Germany, and authorized him to establish bishoprics, the only existing bishopric being the one at Passau. He founded those of Freising, Ratisbon, Erfurt, Baraburg (transferred afterward to Paderborn), Würzburg, and Eichstädt. In 739 he restored the episcopal see of St. Rupert, at Salzburg. After the death of Charles Martel he consecrated Pepin the Short, king of the Franks, in Soissons, by whom he was named Archbishop of Mainz. He held eight ecclesiastical councils in Germany, founded the famous abbey of Fulda, and undertook in 754 new journeys for the conversion of the infidels. In Fulda a copy of the gospels, in his own handwriting, is to be seen, and there is a statue to him also. At the place where Boniface built, in 724, the first Christian church in North Germany, near the village of Altenburg, in the Thuringian forest, a monument has been erected to his memory. The most complete collection of the letters of Boniface was published at Mainz, 1789, folio; and of his entire works, 2 volumes, Oxford, 1845. See *Lives* by Pahler (1879); Werner (1875); Ebrard (1882).

Boniface, the name of several Popes. **BONIFACE I.**, elected 418 by a party of the clergy, and confirmed by the Emperor Honorius, who declared the anti-pope Eulalius a usurper. Boniface condemned Pelagianism, and extended his authority by prudent measures. In a contest with the Emperor Theodosius, who endeavored to take from the bishops of Thessalonica their canonical jurisdiction over Illyria, he successfully vindicated the primacy of the Roman See. **BONIFACE II.**, elected 530; d. 532. The death of his rival, the anti-pope Dioscorus, a few days after his election, left him in quiet possession of the papal chair. During his pontificate St. Benedict laid the foundations of monasticism in the West. **BONIFACE III.**, chosen 607, died nine months after his election. **BONIFACE IV.**, reigned 608–615. He consecrated the Pantheon to the Virgin and all the saints. **BONIFACE V.**, a Neapolitan, was Pope 619–625. He confirmed the inviolability of the asylums, and endeavored to diffuse Christianity among the English. **BONIFACE VI.**, a Roman, elected 896, died a fortnight after. **BONIFACE VII.**, anti-pope, elected 974 during the lifetime of Benedict VI., whose death he was suspected of having caused. Expelled from Rome he returned on the death of Benedict VII., and found the chair occupied by John XIV., whom he deposed and threw into prison, where he died. Boniface died 11 months after his return. **BONIFACE VIII.**,

BONIFACIO — BONITO

Benedict Gaetano: b. Anagni of an ancient Catalonian family; elected Pope 24 Dec. 1294. He studied jurisprudence, was a canon at Paris and Lyons, advocate of the consistory, and prothonotary of the Pope at Rome. After Martin IV. had elevated him to the dignity of a cardinal (1281) he went as legate to Sicily and Portugal, and was intrusted with the charge of reconciling the king of Sicily with Alphonso of Aragon, and Philip the Fair with Edward I. of England. After Coelestine V. had resigned the papal dignity at Naples, in 1294, at the instigation of Boniface, the latter was chosen Pope. He met with opposition from the cardinals of the family Colonna, whose antagonism followed him throughout his entire pontificate. His induction was magnificent. The kings of Hungary and Sicily held his bridle on his way to the Lateran, and served him at table with their crowns on their heads. Boniface, however, was not successful in his first efforts for the increase of his power. He first opposed Albert of Austria in his contest for the imperial title, but finally yielded and crowned him emperor. He was equally unsuccessful in his attempt to arbitrate between England and France. The bulls which he issued at this time against King Philip the Fair of France obtained no consideration. This was also the case with the interdict which he pronounced against him at the Council of Rome in 1302. Intimidating the clergy in France, Philip refused to yield to the Pope's decrees. The Pope was accused of duplicity, of simony, of usurpation, of heresy, of unchastity; and it was resolved to condemn and depose him at a general council at Lyons. Philip went still further; he sent Nogaret to Italy in order to seize his person and bring him to Lyons. Nogaret united himself for this purpose with Sciarra Colonna, who with his whole family were bitterly inimical to Boniface. Boniface fled to Anagni, where Nogaret and Colonna surprised him. Boniface acted with spirit. "Since I am betrayed," said he, "as Jesus Christ was betrayed, I will die at least as a Pope." He assumed the pontifical robes and the tiara, took the keys and the cross in his hand, and seated himself in the papal chair. But the insignia of his holy office did not save him from seizure. Nay, Colonna went so far as to use personal violence. Boniface remained in imprisonment for two days, when the Anagnese took up arms and delivered him. After this he departed to Rome, where he died, a month later, in 1303. **BONIFACE IX.**, Pietro Tomacelli of Naples, succeeded Urban VI. at Rome during the schism in the Church, while Clement VII. resided in Avignon. He was distinguished for the beauty of his person and the elegance of his manners, rather than for a profound knowledge of theology and canon law. Even the counsel of his experienced cardinals could not save him from the commission of gross blunders. He made the annates a regular tax in 1392. Many abuses in the sale of benefices were indulged during his pontificate. A notable event in his reign was the suppression of the rebellion in Rome in favor of a Republic. He supported the pretensions of Ladislaus to the throne of Naples, and during the greatest part of his pontificate was engaged in negotiations at Avignon with his rivals, Clement VII. and Benedict XIII. He died 1404.

Bonifacio, Veneziano, vā-nād-zē-ā'nō bō-ne-fā'chō, Italian painter: b. Venice, about 1525; d. about 1579. He belonged to the Venetian school and his 'Saint Jerome and Saint Margaret'; 'Saint Barnabas and Saint Sylvester'; 'Saint Anthony and Saint Mark' are still in the Venice Academy.

Bonifacio, bō-ne-fā'chō, Strait of, the Fretum Gallicum of the Romans, lies between Corsica and Sardinia, and at the narrowest part is only seven miles wide. The navigation is difficult owing to the rapid current and the great number of rocks, which, however, are favorable to the production of coral.

Bonifazio Veronese, bō-ne-fā'tse-o vā-rō-nā'sā (THE ELDER), Italian painter: b. Verona, 1490; d. 1540. He was a notable colorist of the Venetian school and many of his works have been attributed to Titian and to Giorgione, whose styles he imitated. Among known works of his are 'The Finding of Moses' in the Dresden Gallery, and 'Dives and Lazarus' in the Venice Academy.

Bonin (bō-nēn') Islands, several groups of islands, North Pacific Ocean, extending from lat. 27° 44' 30" to 26° 30' N., south of and belonging to Japan. The northwest island of the most northern cluster, called Parry Group, is in lat. 27° 43' 30" N.; lon. 142° 8' E.; the cluster consists of small isles. The largest of the chain is Peel Island, on the west side of which is a good harbor called Port Lloyd, in lat. 27° 5' 30" N.; lon. 142° 11' 30" E., nearly surrounded by hills crowned with palm trees. Almost every valley has a stream of water. Green turtle abound in the sandy bays. Sharks are numerous, and fish of several kinds plentiful. Peel Island is inhabited by some English, Americans, and Hawaiians, who cultivate maize, vegetables, tobacco, and the sugar-cane. It is frequently visited by vessels in want of water and fresh provisions. The islands were discovered by the Japanese in 1593 and since 1876 have been in the possession of Japan. Pop. about 1,400.

Bonington, or Bonnington, Richard Parkes, English painter: b. 25 Oct. 1801, at Arnold, a village near Nottingham, where his father was a painter and lace manufacturer; d. London, 23 Sept. 1828. When Richard was in his boyhood the family removed to Calais and afterward to Paris. He early displayed a decided predilection for art, and entered as a student at the Louvre, and was also for a time in the studio of Baron Gros. His genius displayed itself in landscape-painting, and he rapidly rose to great eminence in this department, first in Paris and afterward in England, to whose Royal Academy Exhibition he contributed several pictures which created a great sensation. He worked at first entirely in water-color, but from about 1825 he also used oil. A brilliant career was in prospect for him, when he was cut off by pulmonary consumption. See Muther, 'History of Modern Painting' (1896).

Bonito, bō-nē'tō, a fish of the mackerel family (*Scombridae*) nearly related to the gigantic tunny, but smaller, longer in body, and without teeth on the vomer. There are two American species. One (*Sarda sarda*) lives in the open seas, except at spawning time, from Cape Cod to Cape Sable, and occasionally in the Gulf of Mexico, where it weighs 10 to 12 pounds. In color it is dark steel blue above,

BONITZ — BONNEMÈRE

with numerous dark narrow strips obliquely downward and forward from the back, and the under parts, silvery. The California bonito or skipjack (*Sarda chiliensis*), is heavier and is found from San Francisco northward to Japan. In the tropics, the bonito is known as the worst foe of the flying-fish. On the Rhode Island coast the fish is called abbicore.

Bonitz, Hermann, hër'män bö-nīts, German classical scholar: b. Langensalza, 29 July 1814; d. Berlin, 25 July 1888. He was professor in the University of Vienna, 1849-67, director of a gymnasium at Vienna from 1867, and a member of the Academy of Sciences. He was a profound student of Plato and Aristotle and was the author of 'Ueber die Kategorien des Aristoteles' (1853); 'Platorische Studien' (1858-60); 'Aristotelische Studien' (1862-7).

Bonn, a city of the Prussian province of the Rhine, formerly the residence of the Electors of Cologne, on the left bank of the Rhine, over which there is a magnificent new bridge, erected at a cost of \$1,000,000, with a central span of 600 feet. It is a flourishing place, and has been greatly extended and improved in recent years, though it still has many narrow irregular streets. The town hall, completed 1782, is one of the handsomest of its edifices. Another important building is the cathedral, cruciform in plan, and forming an imposing and picturesque example of the late Romanesque style of architecture. The greater part of it dates from the 13th century. But all other buildings and institutions are eclipsed by the celebrity of the university, the charter of which was given 18 Oct. 1818, at Aix-la-Chapelle, by the king of Prussia, who at the same time endowed it with an annual income of about \$60,000. The former residence of the Elector of Cologne was bestowed on the university, and was fitted up at great expense, being surpassed in extent and beauty probably by no university building in Europe. The university possesses a library of more than 275,000 volumes, 1,235 incunabula and 1,376 MSS.; a museum of antiquities, a collection of casts of the principal ancient statues, a collection of coins, observatory, botanic garden, etc. The paintings in the Academical Hall (among others, the great allegorical picture, the 'Christian Church') were executed by some pupils of Cornelius. In the front of the university is an extensive garden, with fine old avenues of trees, while from this quarter runs westward a broad straight avenue, half a mile long, planted with horse-chestnuts, passing the observatory, and leading to the botanic garden and natural history collections of the university, and to the chemical laboratory, the anatomy building, etc. In this quarter also are grounds and buildings for the use of the agricultural institute. Particular advantages are afforded for the education of young men intended for instructors. Many men distinguished in various branches of science have been connected with the university, including Arndt, A. W. Schlegel, and the historian Niebuhr. The exertions of the government to collect in Bonn all the means of instruction, united with the charms of the place and the beauties of the scenery, have made the place famous. In 1901 the students numbered over 2,400. The manufactures, which are not very

important, comprise carpets, machinery, soap, chemicals, stoneware, etc. The means of communication are ample, both by the steamers which ply upon the Rhine and by the railways. Prince Albert studied at Bonn and Beethoven was born there, the house of his birth being now a museum. There are statues of Beethoven and Arndt, a monument commemorative of the war of 1870-1, a monumental fountain, etc. The antiquity of Bonn is considerable, and, as the residence of the electors of Cologne, it is of historical importance. Pop. about 52,000.

Bonn, University of. See BONN.

Bonnassieux, Jean, zhôn bö-na-syê, French sculptor: b. Paunissières, 1810; d. 1892. He studied in Paris and in 1836 received the Prix de Rome. He gained the favor of the French clergy by refusing to model a statue of Voltaire for the façade of the Louvre and thereafter did much work for churches. He was commissioned in 1857 to model a colossal statue of Notre Dame de France for the valley of Puy from the bronze cannon taken at Sebastopol. Other important works of his are 'Amour se conpant les ailes'; 'David Berger, 1814'; and 'Meditation,' for which last he received the cross of the Legion of Honor.

Bonnat, Léon Joseph Florentin, lâ-ôn zhô-sêf flô-rôn-tân bö-na, French painter: b. Bayonne, 20 June 1833. When a young man he spent several years in Spain and Italy. He studied under Madrazo at Madrid, and under Léon Cogniet at Paris, first gaining recognition at the Paris Salon in 1861, when he received a second-class medal. The list of his honors is a large one, including the medal of honor at the Salon of 1869. In the Legion of Honor he was made chevalier in 1867, officer in 1874, and commander in 1882. He paints portraits and genre subjects; many of these are reminiscences of his visits to Italy and Egypt. He became a member of the Institute in 1874, and was chosen chief professor of painting in the Ecole des Beaux Arts in 1888. His work shows the influence of Velasquez and Ribera, and his portraits, such as those of Thiers, Victor Hugo, and Don Carlos, are remarkable for their realism. He has painted the portraits of many Americans and his portrait work is well known in this country.

Bonnechose, François Paul Emile Boisnormand de, frân-swâ pôl â-mêl bwâ-nôr-man bö-n-shôz, French poet and historian: b. Leyerdorp, Holland, 1801; d. 1875. He was librarian of the palace of Saint Cloud for some years and subsequently held similar posts. His one notable poetical composition is 'The Death of Bailly' (1833). Besides a 'History of France' he was author of 'Reformers Before the 16th Century Reformation' (1844); 'The Four Conquests of England' (1851); 'History of England' (1859); 'Bertrand du Guesclen' (1866).

Bonnemère, Joseph Eugène, zhô-sêf è-zhân bö-n-mär, French historian: b. Saumur, 21 Feb. 1813. In early life he wrote a number of plays; but owes his reputation to a series of historical publications, 'History of the Peasants' (1856); 'Vendee, in 1793' (1866); 'Popular History of France' (1874-9); 'History of the Religious Wars in the Sixteenth Century' (1886); etc.

BONNER — BONNET-ROUGE

Bonner, Edmund, English prelate: b. about 1495; d. London, 5 Sept. 1569. For his skill in canon law he was patronized by Cardinal Wolsey, on whose death he acquired the favor of Henry VIII., who made him one of his chaplains, and sent him to Rome on business connected with his divorce from Queen Catharine. In 1535 he was made archdeacon of Leicester. In 1538 he was nominated bishop of Hereford, being then ambassador at Paris; but before his consecration he was translated to the see of London. In 1542-3 he was ambassador to the Emperor Charles V. After Edward VI.'s accession in 1547 he was deprived of his bishopric for non-obedience in connection with the injunctions and the 'Book of Homilies.' He was shortly afterward restored, but still continuing to act with contumacy, he was, after a long trial, once more deprived of his see, and committed to the Marshalsea (1549); from which prison, on the accession of Mary, he was released, and once more restored in 1553. During this reign a most sanguinary persecution of the Protestants took place, many of whom Bonner was instrumental in bringing to the stake, though it appears he was hardly severe enough to meet the wishes of the king and queen. When Elizabeth succeeded he went with the rest of the bishops to meet her at Highgate, but was coldly received. He remained, however, unmolested, until his refusal to take the oath of supremacy; on which he was committed to the Marshalsea (1560), where he remained a prisoner for nearly 10 years, until his death. He was buried at midnight, to avoid any disturbance on the part of the populace, to whom he was extremely obnoxious.

Bonner, Robert, American publisher: b. near Londonderry, Ireland, 28 April 1824; d. New York, 6 July 1899. Coming to the United States in 1839 he learned the printer's trade on the *Hartford Courant*, and gained the reputation of being the most rapid compositor in Connecticut. In 1844 he removed to New York, and seven years later had saved enough money to buy the plant of the 'Merchants' Ledger,' a small business periodical. Changing its name to the 'New York Ledger,' he turned it into a literary publication, printing the most popular kind of stories. This, combined with sensational advertising methods, and the unprecedented prices paid to famous contributors, soon gave the 'Ledger' an enormous circulation. Henry Ward Beecher was paid \$30,000 for his 'Norwood'; Tennyson received \$5,000 for a short poem, and Dickens the same amount for a short story. At times \$25,000 a week was spent in advertising the paper. Retiring in 1887, the rest of his life was spent in indulging his taste for fast horses. It was his ambition to own the fastest trotters in existence, and whenever he purchased a record breaker, the animal was immediately withdrawn from public racing. His expenditures for fast horses exceeded \$600,000. Some of them and their cost were: Dexter, \$35,000; Rarus, \$36,000; Maud S., \$40,000; Sunol, \$41,000. He was a generous giver to many charitable institutions and causes, to Princeton University and the Fifth Avenue Presbyterian Church. He had a genuine dislike for publicity, and many of his benefactions were never made public till after his death.

Bonnet, Charles, Swiss naturalist and metaphysician: b. Geneva, 13 March 1720; d. Genthod, 20 May 1793. His essay 'On Aphides,' in which he proved that they propagated without coition, procured him in his 20th year the place of a corresponding member of the Academy of Sciences at Paris. Soon afterward he partook in the discoveries of Trembley respecting the polypus, and made interesting observations on the respiration of caterpillars and butterflies, and on the structure of the tapeworm. Bonnet was a close and exact observer. He carried religious contemplations into the study of nature. In his views of the human soul many traces of materialism are to be found; for instance, the derivation of all ideas from the movements of the nerve fibres. Of his works on natural history and metaphysics there are two collections; one in 9 volumes 4to, the other in 18 volumes 8vo (Neuchâtel, 1779). The most celebrated are 'Traité d'Insectologie'; 'Recherches sur l'Usage des Feuilles dans les Plantes'; 'Considérations sur les Corps organisés'; 'Contemplation de la Nature'; 'Essai analytique sur les Facultés de l'Ame'; 'Palingénésie Philosophique'; and 'Essai de Psychologie.'

Bonnet, in fortification, an elevation of the parapet at a salient angle, designed to prevent the enfilading of the adjoining front of the work, where it is situated. The bonnet accomplishes, however, only part of this object, and is subject, at least in field-works, to the disadvantage, that the men destined for its defense are too much exposed to be taken in flank by the fire of the enemy, on account of the necessary elevation of the banquette, a fault which cannot occur in the works of a fortress which are well laid out. The term also denotes a covering for the head, now especially applied to one worn by females. In England the bonnet was superseded by the hat as a head-dress two or three centuries ago, but continued to be distinctive of Scotland to a later period.

Bonnet-head, a small shark of the genus *Reneiceps*, frequenting warm seas and related to the shovel-heads (q.v.).

Bonnet Monkey. See *MACAQUE*.

Bonnet-piece, a Scotch coin, so called from the king's head on it being decorated with a bonnet instead of a crown. It was struck by James V., and is dated 1539. Bonnet-pieces are very rare and in high estimation among antiquaries.

Bonnet-rouge, bō-nā-roozh, an emblem of liberty during the French Revolution, and worn as a head-dress by all who wished to show themselves sufficiently advanced in democratical principles. It is said by some to have been adopted in imitation of the Phrygian cap of the same color which was worn by those who had obtained emancipation from slavery, while others maintain that it had a much more lowly origin, and was borrowed either from the Marsellaia bands that flocked to Paris, or from a few Swiss soldiers who, having been sentenced to the galleys for insubordination to their officers, obtained their liberty on the acceptance of the constitution in 1790. Having returned in a kind of triumphal procession, wearing the red cap, which had formed part of their galley dress, the fancy of the people was struck, and the

bonnet-rouge was considered indispensable to every true patriot. Even the unfortunate Louis XVI. wore it when paraded through the streets, after narrowly escaping with his life from the mob which had burst into his palace. After it had ceased to be generally worn, it became the distinctive badge of the men of the Mountain. During the storms of more recent periods attempts have repeatedly been made to bring it again into fashion. These have not been successful, but the revolutionary cap rejected by France has met with a more favorable reception abroad, particularly among the newly formed republics of America, where it is often stamped upon coins, or used as an emblem upon seals. Under the restoration of the Bourbons the sou-briquet of bonnets-rouges was applied to individuals who either had figured in the revolution or were supposed to hold revolutionary principles.

Bonneval, bôn-val, Claude Alexander (COUNT DE OR ACHMET PASHA), French adventurer: b. Coussac, 1675; d. Constantinople, 1747. In the war of the Spanish Succession he obtained a regiment and distinguished himself by his valor as well as by his excesses. He was, in 1706, appointed major-general by Prince Eugene, and fought against his native country. At the Peace of Rastadt in 1714, by the interference of Prince Eugene, the process against him for high treason was withdrawn, and he was allowed to return to his estates. In 1716 he was lieutenant field-marshal of the Austrian infantry, and distinguished himself by his valor against the Turks at Peterwardein (1716). In 1718 Bonneval was made a member of the imperial council of war, but his licentiousness and indiscretion induced Prince Eugene to get rid of him by appointing him in 1723 master-general of the ordnance in the Netherlands. To revenge himself on Eugene, he sent complaints to Vienna against the governor, the Marquis de Prié; but the latter received an order to arrest Bonneval, and to imprison him in the citadel of Antwerp. Bonneval being afterward ordered to appear at Vienna and give an explanation of his conduct, spent a month at The Hague before he chose to comply with the summons. He was therefore confined in the castle of Spielberg, near Brünn, and condemned to death by the imperial council of war; but the sentence was changed by the emperor into one year's imprisonment and exile. Bonneval now went to Constantinople, where the fame of his deeds and his humanity toward the Turkish prisoners of war procured him a kind reception. He consented to change his religion, received instructions in Mohammedanism from the mufti, and received the name of Achmet, with a large salary. He was made a pasha of three tails, commanded a large army, defeated the Austrians on the Danube, and quelled an insurrection in Arabia Petræa. His exertions, as commander of the bombardiers, to improve the Turkish artillery, were opposed by the jealousy of powerful pashas, the irresolution of Mohammed V., and the dislike of the Turkish troops to all European institutions. He enjoyed, however, the pleasures of his situation. The memoirs of his life under his name are not genuine.

Bonneville, bôn-vil, Benjamin L. E., American soldier and explorer: b. France about 1795;

d. Fort Smith, Ark., 12 June 1878. He graduated from West Point 1815, became a captain of infantry 1825; and in 1831-6 engaged in an exploring expedition to the far West, across and beyond the Rocky Mountains. His journal and other manuscripts were edited and enlarged by Washington Irving, who published them under the title of 'Adventures of Captain Bonneville, U. S. A.' (1837). He fought with gallantry in the Mexican war, taking part in the siege of Vera Cruz, the battle of Cerro Gordo, the capture of San Antonio, battle of Churubusco, where he was wounded, the battle of Molino del Rey, the storming of Chapultepec, and the ensuing assault and capture of the city of Mexico. In 1857 he commanded the Gila expedition, and in 1861 was retired from active service, "for disability resulting from long and faithful service, and from sickness and exposure in the line of duty." In 1865 he was brevetted brigadier-general in the regular army "for long and faithful services." See Cullum, 'Officers and Graduates of the U. S. Military Academy,' Vol. I. (1868).

Bonneville, Lake, a lake of the Pleistocene epoch that twice filled a now desert basin of Utah. At its greatest dimensions it had an area of 20,000 square miles, and was 1,000 feet deep.

Bonney, Charles Carroll, American lawyer: b. Hamilton, N. Y., 4 Sept. 1831; d. Chicago, Ill., 1903. In 1850 he removed to Peoria, Ill., took an active part in establishing the present educational system of that State; was admitted to the bar 1852, settled in Chicago in 1860, and acquired a large and successful practice. He was one of the originators of the law and order movement and was president of the National Law and Order League 1885-93. In 1893 he was the organizer and general president of the World's Congresses held at the Columbian Exposition; there were over two hundred of them, and they proved a marked feature of the World's Fair. Besides numerous pamphlets, addresses and essays on public questions he has written 'Rules of Law for the Carriage and Delivery of Persons and Property by Railway' (1864); 'Summary of the Law of Marine, Fire, and Life Insurance' (1865); 'Our Remedy in the Laws' (1887); and edited A. W. Arrington's 'Poems' (1869).

Bonney, Thomas George, English geologist: b. Rugeley, 27 July 1833. He was president of the Geological Society of London 1884-6, and in 1899 became vice-president of the Royal Society. He has written 'Outline Sketches in the High Alps of Dauphine' (1865); 'The Alpine Regions' (1868); 'The Story of Our Planet' (1893); 'Charles Lyell and Modern Geology' (1895); 'Ice Work' (1896); 'Volcanoes' (1898), and four volumes of Sermons.

Bonnie Blue Flag, a popular Confederate ballad first sung in public at the Varieties Theatre in New Orleans in 1861.

Bonnières, Robert de, ro-bâr dé bôn-nî-âr, French journalist and novelist: b. Paris, 7 April 1850. He began his literary career as contributor to Paris journals of spirited but waspish biographies of contemporary men; these were collected and published in three successive volumes of 'Memoirs of To-Day.' His novels are full of transparent allusions to noted persons,

BONNIVARD — BONSTETTEN

and have had a very great vogue. In one of them, 'The Monarch,' he portrays high Jewish society in Paris.

Bonnivard, François de, frân-swâ dë bō-ne-vâr, Swiss patriot, a younger son of a family which held large possessions under the House of Savoy: b. Syssel about 1496; d. Geneva, 1570. In 1513 he became prior of St. Victor at Geneva, but falling under the suspicion of the Duke of Savoy, was taken prisoner by him in 1519. After 20 months' imprisonment he was set free, but in 1530 he was again seized and taken to the castle of Chillon at the east end of the Lake of Geneva, where he was imprisoned for six years, the last four in that subterranean vault which Byron has made famous by his poem on the sufferings of 'The Prisoner of Chillon.' He left the town his books, which were the nucleus of the Geneva library. His chief works are his 'Chroniques de Genève' (1551; new ed. 2 vols. 1831), and 'De l'Ancienne et Nouvelle Police de Genève' (1555). See Gribble, 'Lake Geneva and Its Literary Landmarks' (1901).

Bonny, a river of west Africa, one of the mouths of the Niger. The town of the same name is situated on the eastern bank of the river near its mouth. It has a good harbor and does a considerable trade in palm-oil, but the climate is unsuitable for Europeans. Pop. about 8,000.

Bonnycastle, Charles, English mathematician: b. Woolwich, 1792; d. Charlottesvile, Va., October 1840. He was professor of mathematics at Woolwich Military Academy, professor of natural philosophy in the University of Virginia (1825-7), and of mathematics there from 1827. His publications included 'Elements of Geometry'; 'Elements of Algebra'; 'Mensuration,' etc.

Bonnycastle, Sir Richard Henry, English military engineer: b. 1791; d. 1848. He was a brother of Charles Bonnycastle (q.v.) and spent the greater part of his life in British North America. He was author of 'Spanish America' (1818); 'The Canadas in 1842' (1842); 'Canada and the Canadians in 1846' (1846); and 'Canada as It Was, Is, and May Be' (1846).

Bonomi, Giuseppe, joo-sêp'pë bō-nō'më, Italian artist: b. Rome, 9 Oct. 1796; d. 3 March 1878. He was a son of Giuseppe Bonomi, the architect. He studied art in London, and became famous as a draftsman, especially of Egyptian remains. He repeatedly visited Egypt and the Holy Land, and illustrated important works by Wilkinson, Birch, Sharpe, Lepsius, and other Egyptologists. He also published a work of his own on Nineveh, and at his death was curator of Soane's Museum.

Bononcini, or Buononcini, Giovanni Battista, jō-vân'ne bō-nōn-chē'ne, Italian composer: b. Modena about 1660; d. about 1750. His proficiency on the violoncello gained him admittance into the band of the Emperor Leopold at Vienna, where, at the age of 18, in emulation of Scarlatti, he wrote an opera called 'Camilla,' which was favorably received. In England for several years scarcely any opera was tolerated which did not contain some of Bononcini's airs, and upon the almost simultaneous arrival of himself and Handel in London, notwithstanding the superiority of the latter, two parties, the one for Bononcini and the

other for Handel, were formed; between whom an exciting contest was waged for several years. Gradually, however, Bononcini's popularity waned, and having been detected in an act of musical plagiarism, he left England in 1733, found his way to Paris and Vienna, and finally went to Venice, where all traces of him are lost.

Bononcini, Giovanni Maria, Italian musician: b. Modena, 1640; d. 19 Nov. 1678. He was educated at Bologna, was in the service of the Duke of Modena, Francis II., and also maestro di capella of San Giovanni in Monti. He was considered an authority on the theory of music on account of his work 'Musico pratico'; he also wrote numerous musical compositions, both vocal and instrumental.

Bonone, bō-nō'nā, Carlo, Italian painter: b. Ferrara, 1569; d. 1632. He studied the works of the Caracci and Veronese, and shows the influence of both styles in his own work. He taught painting in Ferrara, having many prominent painters of the town under his instruction. Among his paintings are 'The Arisen Christ' and 'Patriarchs and Prophets.'

Bonpland, Aimé, ā-mā bōn-plān, Jacques ALEXANDRE, French naturalist, noted as the friend of Humboldt, and the companion of his wanderings: b. Rochelle, 22 Aug. 1773; d. Corrientes, Argentina, May 1858. He studied medicine, and served for a while in the French navy as surgeon. Having returned to Paris to continue his studies, he there made the acquaintance of Humboldt, then a young man actively engaged in the pursuit of scientific knowledge at the French capital. On the latter projecting his journey to the New World, Bonpland readily agreed to accompany him, and shared in all the adventures and toils of that celebrated expedition. In the course of it he collected upward of 6,000 plants, previously unknown, and on his return to France in 1804 presented his herbarium to the Museum of Natural History, and had a pension granted him by the Emperor Napoleon. A great friendship subsisted between him and the Empress Josephine, who frequently endeavored to cultivate in her garden at Malmaison the flowers whose seeds he had brought from the tropics. On the Restoration he proceeded to South America, and became professor of natural history at Buenos Ayres. He subsequently made an extensive journey across the Pampas to the foot of the Andes, and ascended the river Parana into Paraguay, but was arrested by Dr. Francia, the governor of Paraguay, as a spy, and detained a prisoner for eight years, till 1829. He afterward settled at San Borja, near Monte Video, and after 1850 lived at Corrientes.

Bonsal, Stephen, American journalist: b. Virginia, 1863. He was educated at Concord and Heidelberg. In the Bulgarian-Servian war he was special correspondent of the New York Herald, serving in the same capacity in Macedonia and Cuba. He has been secretary of Legation of the United States in Pekin, Madrid, Tokio, and Corea. He has written 'The Real Condition of Cuba'; 'The Fight for Santiago'; 'Morocco as It Is'; 'Across the Pacific.'

Bonstetten, bōn-stët'ën, Karl Victor von, Swiss publicist: b. Bern, 3 Sept. 1745; d. Geneva, 3 Feb. 1832. He studied at Leyden, Cam-

bridge, and Paris; entered the council of Bern, and became district governor, and, in 1795, a judge in Lugano. He lived in Italy and at Copenhagen from 1796 to 1801, and after his return settled at Geneva. Among his larger works are 'Recherches sur la Nature et les Loix de l'Imagination' (Geneva 1807); 'Pensées Diverses' (1815); 'Etudes de L'Homme' (1821), and 'L'Homme du Midi et L'Homme du Nord' (1824), an examination of the influence of climate. Several volumes of his correspondence have been published.

Bontebok, bôn'te-bök, a small South American antelope (*Bubalis pygargus*) closely allied to the bleesbok (q.v.), but a slightly larger size, and having the continued white blaze on the face to the root of the lyrate horns. See HARTREEST.

Bonus Bill, an act reported to the United States House of Representatives by John C. Calhoun, 23 Dec. 1816, appropriating "as a fund for constructing roads and canals" the \$1,500,000 paid by the United States bank as a bonus for its charter privileges, and all future dividends from its stock. The real object was to build the Erie Canal, which New York did not feel able to do alone. Its managers,—De Witt Clinton, Gouverneur Morris, etc.,—relying on the administration holding the same ideas which Jefferson and Gallatin had formerly voiced, formed a "log-roll" in Congress with various local interests, and carried the bill by 86 to 84 in the House, and 20 to 15 in the Senate, the opposition being scatteringly local rather than sectional, or constitutional; but Madison vetoed it on strict-construction grounds. The apparent injury was to New York: the real injury was to the South. New York went on and built the canal herself, giving her an irresistible advantage over her rivals, while the South was not rich enough to build the canals from the Chesapeake to the Ohio, enriching Maryland and Virginia, nor from the Santee to the Tennessee, enriching the Carolinas and Tennessee, and if the general government had helped the Erie it must have helped the others also.

Bonvalot, Pierre Gabriel, pe-är gā-brē-äl bôn-vā-lō, French explorer: b. Espagne, Aube, 1853. He traveled in central Asia, 1880-2; Persia, Turkestan, and the Pamirs, 1885-7; and in Siberia and Tonkin, 1889-90. He has written 'En Asie Centrale'; 'Du Moscou en Bactriane' (1884); 'Du Kohistan à la mer Caspienne' (1885); 'Du Caucase aux Indes à travers le Pamir' (1888).

Bonvin, François Saint, frāñ-swā sǎñ bôn-vāñ, French genre painter: b. Vaugirard, 22 Sept. 1817; d. Saint Germain-en-Laye, 18 Dec. 1887. He was self-taught, exhibited often at the Paris Salon and received the medal of the Legion of Honor in 1870. For a long period his work was not popular, but his paintings are now much prized by collectors on account of their rich coloring and sober tone. Among them are 'Charity' (1852); 'Regimental School' (1853); 'Corner in a Church' (1880).

Bony-fish. See MENHADEN; TEN-POUNDER.

Bony, or Gar Pike. See GAR.

Bonzes, bôn'zēs, a name given by Europeans to the priests of the religion of Fo, or Buddha, in eastern Asia, particularly in China, Burma, Tonquin, Cochinchina, and Japan.

As these priests live together in monasteries, unmarried, they have some resemblance to the monks of the Christian Church. They do penance, and pray for the sins of the laity, who secure them from want by endowments and alms. The female bonzes may be compared to the Christian nuns, as the religion of Fo suffers no priestesses, but admits the social union of pious virgins and widows, under monastic vows, for the performance of religious exercises. The bonzes are commonly acquainted only with the external forms of worship and the idols, without understanding the meaning of their religious symbols.

Booby, a name given long ago by British sailors to several of the smaller tropical species of gannet (q.v.), because of their "stupidity," which consisted simply in their fearlessness when visited upon their island breeding places. Having had no acquaintance with mankind they had no reason to fear him. Most of the species are widespread, and, in their haunts abundant. One species (*Sula variegata*) is, however, confined to the coasts of Peru, where it contributes largely to the valuable guano deposits on the islands there.

Book. Used without qualification, the term currently implies a printed literary composition in many sheets; but in law and custom it has received three extensions, one of form and two of matter. The form includes anything bound like a book—volumes of accounts, or of blank leaves for keeping them or for indexing, etc., and even "books" of gold-leaf, 25 thin strips in a cover. The matter includes—by English statute law, "every volume, part or division of a volume, pamphlet, sheet of letter-press, sheet of music, map, chart, or plan separately published"; in literary usage, the written compositions of ancient times on whatever material, if of some volume.

Historically, it is curious that primitive attention has invariably seized first on, and named the writing after, neither form nor matter, nor even the method of writing, but the material on which the writing was executed: every name in common use, present or past, refers to this. "Book," A.-S. *bōc*, is from an old Teutonic *boks*, that is, "the beeches," tablets of beech-bark on which runes were cut or painted; Latin *liber*, whence French *livre* and our "library," was the same thing, the inner bark of a tree, and the name was later given to the papyrus tissue from its bark-like appearance; *codex* or *caudex*, our "code," and still used in its Latin form for old texts, meant the trunk of a tree, then wooden tablets, then square volumes like wooden blocks instead of those in scrolls; the Greek *byblos*, our "Bible," was another name for the papyrus; and modern usage clings to the same connection of ideas—we speak of reading "a paper" before an audience. On the other hand, the words "write," "inscribe," and "scripture," and the various "graphs," all from words meaning to cut, commemorate a time when all writing was by scoring lines on some hard substance. Of course special terms refer to various aspects of the book: "volume" (Latin *volumen*, from *volvo*, to roll) was the wooden roller around which a convenient section of a long composition was twisted; "tome" means a cutting—of the book into parts, exactly the same as "section."

BOOK

It is difficult to say at just what point the ancient writings may properly be called "books." It is evident that mere scorings or paintings of short compositions on a single surface—runes, hymns, poems, epistles, proclamations, business documents, or what not—cannot be called books, even if the surface is large; though Lord Macaulay facetiously speaks of a rising young Assyrian architect who "published a bridge and four walls in honor of the reigning emperor." On the other hand, long compositions carried over many tablets, grouped in numbered or lettered pages and divided into "volumes" or shelves, and even sometimes with the owner's book-plate (q.v.) attached, cannot be denied the name; nor can extensive compositions on papyrus like the 'Book of the Dead,' dating back well toward 2000 B.C. if not earlier, nor the famous 'Papyrus Prisse,' the oldest volume known to exist. The Babylonian and Assyrian books were drawn on clay tablets or polygonal cylinders (afterward hardened) with an iron stylus, producing the wedge-shaped or "cuneiform" characters, some of them so small and skilfully executed that they suggest the use of a magnifying glass—quite likely a ball of crystal. These about the 7th century B.C. had begun to be gathered into royal or temple libraries, to the inestimable service of modern historical research: the vast majority of our knowledge of old Babylonia and Assyria comes from two great libraries, that of Ashurbanipal (Sardanapalus: 668-626 B.C.) at Nineveh, and that of the Temple of Bel at Nippur. Yet, oddly, while our civilization as a whole is a direct heir of the Babylonian, and its details owe to that, through the Greek and Latin, a score of items to one of the Egyptian, our books have no connection with the Babylonian and are the immediate progeny of the Egyptian; an unbroken sequence can be maintained from the volume in the reader's hand to the 'Papyrus Prisse,' perhaps more than 2,000 years before Christ, and containing the still older composition, regarded as the oldest extant book in the world, the 'Maxims of Ptah-Hotep,' dating probably from 2500 B.C.

Owing to the cheap and easy preparation of the papyrus tissue, by pulping the pith and spreading it out to dry, essentially like our paper, and its wonderful adaptability to literary use beyond anything discovered for many ages,—its thinness and lightness, yet hard, smooth, glossy surface showing off inks and pigments so beautifully—its use spread to Greece before the time of Herodotus at least, and to Rome, and maintained its position as a book material down to the 10th century A.D. Ali ibn el Azhad in 920 describes the different kinds of pens required for writing on paper, parchment, and papyrus (see Karabacek's 'Das Arabische Papier,' 1887). Unhappily, however, it had one insuperable defect for laws, records, or whatever else needed perpetuity: it was very sensitive to dampness, and dissolved and crumbled away in a few generations. Hence it is not merely probable but certain that the great mass of classical literature is lost forever, disintegrated and gone with its material record. The only place where any considerable finds are still possible is Egypt, whose dry climate can preserve such things for countless ages, and whose libraries had vast quantities of the best Greek and Roman works; some remarkable discoveries

have already been made there, and more may be hoped for. But for this reason, papyrus was largely supplanted for public uses, and with the wealthier collectors or authors, or for very popular books, by parchment, fine dressed skin, the material used by the Jews, Persians, and other Oriental nations. When the book had outlived its popularity or a more exigent use was found for the parchment, which was costly, the former writing was rubbed off or in, and a new book copied on, and this process was repeated sometimes six or seven times. Thanks to the fact that the erasure always left the outline of the old characters possible to revive by certain chemicals, and that for clearness the new book was written crosswise to the old, so that the imperfectly erased words should not show up through and cause confusion, these *palimpsests* have yielded us many treasures supposed to have been extinguished.

As the very name "book" shows, however, paper-pulp and skin and clay were not the only materials used for books by the ancients; in fact, it would be hard to cite any common smooth-surfaced article not so used. Animal, vegetable, and mineral substances have all been drawn on; metals, wood, wax, ivory, leaves, bark, etc. Wooden books were common among both Greeks and Romans; part of one containing Solon's laws was preserved at Athens till the 1st century. For the more important purposes, laws and edicts, they employed (before the general accession of parchment) ivory, bronze, etc.; Hannibal engraved an account of his campaigns on bronze plates, which if they could be supposed existent, would be worth excavating all South Italy for, especially as the writing must have been in Carthaginian. The antiquary Montfaucon in 1699 bought at Rome a book of six thin leaden leaves, about 4x3 inches, with covers and hinges of lead; it contained Egyptian hieroglyphics, etc. For the common needs of business and social life, however,—contracts and wills, letters either of love or friendship, memoranda, etc.—the Romans used *diptycha* and *tabula* or *pugillaria*—sheets covered with wax, to be written on with a stylus, and protected from contact by a raised margin, or opposite projections in the centres. Two of these, of date 169 A.D., were discovered early in the 19th century in Transylvania, and one of 1301 is preserved in the Florentine Museum. In the University of Göttingen is a Bible of palm-leaves, containing 5,376 leaves. Among the Kal-muck Tartars was found a collection of books made of long narrow leaves of varnished bark, the ink black on a white ground.

The shape of wooden and metal books, waxen and ivory tablets, and those of other hard substances, was square; but the thin flexible papyrus was too liable to dog's-ear and tear from handling in such form, and a method was adopted which has left deep traces on our book terminology—of rolling the sheets on wooden cylinders, very much in the fashion of a modern mounted map. They were written on one side only, fastened together at the edges, and glued or otherwise attached to the roller, which was called in Egyptian a *tama*, in Greek a *kulindros* (cylinder), in Latin a *volumen* (roller), our "volume." We still speak of a piece of writing poetically as a "scroll." Some of these were of huge size: specimens of Egyptian book-rolls still exist extending to 20 and even 40

BOOK

yards (see Birt's 'Das Antike Buchwesen,' p. 439); but the great inconvenience of consulting such enormous sheets, and the injury to themselves in the process, caused the breaking up of lengthy literary productions into sections, each on a separate roll. Certain handy sizes became normal, like the ordinary novel or essay volume of to-day; and this conventional length of roll exercised great influence on the length of what are still called the "books"—that is, chapters—of the classical authors, one of these being about enough to make a roll or volume of. At each end of the roller was the *umbilicus* (navel) or *cornus* (knob), a boss to turn it by, and the volume was read by unrolling the scroll to expose successively the sheets or *pagina* (things "fastened" together). The title was generally written in red, on fine vellum, and pasted on the outside, which was dyed with cedrus or saffron. Much labor and expense was often involved in the ornamentation of books, and pleasant conceits were sometimes conveyed by their color. The practice of perfuming the pages to which Martial alludes, "When the page smells of cedar and mantles with royal purple," was not abandoned till very modern times. Lord Burghley, instructing the vice-chancellor of Cambridge concerning the proper presentation of some volumes to Queen Elizabeth, cautions him to "regard that the book had no savor of spike" (spikenard), "which commonly bookbinders did seek to add to make their books savor well." It seems an odd lure to book-buyers; but in this age we can hardly realize the important part played by perfumes in ages when pretty much everything and everybody smelt ill, when filth and the lack of washing or changing of clothes assailed all noses with evil stench, and an agreeable scent was one of the greatest and rarest luxuries of life. In Egypt the rolls were kept in jars holding nine or ten each; in Rome they were kept in wooden boxes or canisters, often of costly workmanship, or in parchment cases. The change from scrolls to *codices*, or square books, seems to have taken place generally in the ancient world after the adoption of parchment or vellum; they appear to have been coming into general use in Martial's time (last half of the 1st century A.D.), as he alludes to their advantages. The name *codex* is still used for the more important ancient MSS., as the "Codex Alexandrinus." Not all the parchments were folded or arranged in small square sheets as now, however: M. Santander owned a beautiful Hebrew Pentateuch written on 57 skins of Oriental leather, sewed together with threads or strips of the same material; it formed a roll of 113 French feet (120.45 English) long. And practically the same arrangement of successive surfaces had been enforced in the use of the clay or wooden tablets, from the nature of the articles. The form remained substantially unaltered throughout the Middle Ages, and being even more suitable for paper than for vellum, was ready on the invention of printing to facilitate its full development; though important differences in bulk, arising as well from the condition of the art and its materials as the fashion of the times, distinguish books of the earlier periods of printing from those of to-day.

Production and Prices (see also AMERICAN PUBLISHING).—It is assumed that until the invention of printing, books were of

excessive rarity and costliness. This is mostly true of the Middle Ages, when the only trained chirographers were in the monasteries—working at free will and leisure and caring solely for quality, and with the express object of making the books costly. It was not so, however, in classic times, owing to that society being based on skilled slave labor. From this cause, the greatest extremes of price prevailed side by side, extreme cheapness and almost incredible dearness. When but few copies of a book were made, either by an author of slender means or by a wealthy amateur to give to friends, they were either given away, or if sold might command any price an unexpected favor of a rich man's fancy dictated; and from the same cause "unique copies"—most likely such were the three books of Philolaus the Pythagorean, for which the not rich Plato paid about \$1,600, and the few books of the philosopher Speusippus for which Aristotle paid three Attic talents or some \$3,500—were much commoner than now. On the other hand, Anaxagoras' works could be had for a drachma (about 18 cents) even when dear—a thing the more strange that two pieces of papyrus for copying an account cost in 407 B.C. 2 drachmæ 4 oboli, or about 45 cents. Perhaps there was a difference in the paper. In this same year a *diptychon*, or pair of wooden account tablets (pass-book), cost a drachma; but in Demosthenes' time, three quarters of a century later, one (probably smaller) cost only two *chalci* ("coppers"), less than a cent. All these contradictions are probably due to the lack of any regular publishing market.

The long agonies of dissolution of the Roman empire annihilated the book trade; and for centuries the only makers of books were the monk scribes, in whom the important conditions of skill, leisure, love, and patience were all fulfilled. Learning had become the exclusive privilege of a class, a privilege of which they were at once proud and jealous; and they surrounded the means of its acquisition with a pomp and circumstance that precluded the multitude from familiarity with it. In the earliest times books had received the adorning aid of ornamental art; but in the Middle Ages they reached the acme, if not of beauty and convenience, at least of cost. The favored works of the time, principally of the Christian writers, were laboriously transcribed by patient penmen, in *scriptoria* liberally maintained in the monasteries, and specially devoted to that purpose. In the process of preparation their books received the most careful attention in regard to accuracy, elegance, and solidity. In the monasteries also the work was completed; for not only were the monks transcribers, illuminators, and binders, but the same individual frequently combined the triple function in his own person. From the hands of the scribe, whose solemn adjuration at the conclusion of his task was evidence not only of his own care but of his desire that others should imitate his example, the book passed to the illuminator, whose gorgeous colors still delight the bibliophile; and from him to the binder, by whom its ponderous proportions were encased in massive covers of wood and leather, studded with knobs and bands, often of gold and silver, and closed with broad clasps—to unfasten which, letting the covers swing open on their stout hinges, was a privilege to which

not every one was permitted to aspire. For, as said Richard De Bury, "laymen, to whom it matters not whether they look at a book turned wrong side upward or spread before them in its natural order, are altogether unworthy of any communion with books." Precious metals and the less crude but equally costly productions of art contributed to swell their value, in respect of which they stood at times on an equality with houses and lands. When publicly exposed, they were frequently secured by chains; they were protected by special statutes; were subjects of grave negotiation; solemnly bequeathed by will, and lent only to the higher orders, who were compelled to deposit ample pledges for their return. Even so late as 1471, Louis XI. was compelled by the faculty of medicine at Paris to deposit a valuable security, and give a responsible endorser, in order to obtain the loan of the works of Rhasis, an Arabian physician. Instances of the immense prices of special books are familiar, as of King Alfred's giving eight hides (perhaps 500 acres) of land for one book, but England was well-nigh bookless then; of the countess of Anjou giving 200 sheep and other articles for a book of homilies of a bishop—an enthusiastic lady might do so if she liked the bishop; and of other fancy prices for very fine books, not however more than modern collectors might for superb copies. The form in these cases often counted for more than the matter, just as now. On the other hand, in 1431, shortly before the invention of printing, Peter Lombard's works sold at Caen for 7 francs, or \$1.30, probably equal to about \$10 now; but he was the most popular and widely circulated author in the Christian world before Thomas à Kempis, and it was to the interest of the Church to multiply his works. Making all allowances, books were very scarce and costly.

Arrangement of a Book.—The first page or *recto* of the first leaf or "folio" is technically known as a bastard or half-title page; the next page or *verso* of the first folio is left blank. (The term "folio," however, as usually employed by printers, means simply page number.) Then follows the title-page proper, usually with a blank page at the back. In many books there intervenes a preface or introduction, a dedication, and a table of contents, before the main body of the book begins; the table of contents is sometimes before and sometimes after the introduction and preface. If any portion of the book is out of place, there are two ways by which the true order may be discovered. At the outer corner, or in the centre above the reading matter, or in pages with a chapter heading usually in the centre at the bottom of the page, is a numeral either Arabic or Roman—1, 2, 3, or i, ii, iii; the almost universal custom now is to use the Roman numerals for prefaces and introductions, and the Arabic for the body of the text, and in catalogues these are indicated thus: pp. xxxvii, 325—that is 37 pages introduction paged with Roman letters, and 325 of text paged with Arabic. As a guide to the binders in gathering the sheets, also, each "form" as printed on the press—the number of pages printed on one sheet, to be folded and cut later into the proper order of reading—has at the bottom of its first page a number or letter in sequence through the book; that is, if each sheet as printed has eight pages on it, then

pages 1, 9, 17, etc.,—the *outside* sheet of each form, which lies on top and visible when the sheet is folded,—will have the numbers 1, 2, 3, etc., or the letters A, B, C, etc., called "signatures," to show the binder in what order the folded sheets are to be assembled. If the forms outnumber the letters of the alphabet when these are used, the signature series continues either as AA or 2A, etc. When two sections of a book begin printing simultaneously for expedition, and as it is uncertain where the first will end, the second has its page folios begun by guesswork—if the first runs over it is necessary to duplicate a certain number of the closing pages of the first section, as 480A, 481A, etc., or else to continue the closing number, as 496A, 496B, etc., or if only one or two, 496½, 496¾.

Sizes of Books.—The copyists made up their paper or vellum books by folding four, five, or six sheets and placing one within the other, making quires or gatherings of 8, 10, or 12 leaves, known respectively as quaternions, quinterns or quinternions, and sexterns, or in Greek tetradia, pentadia, and hexadia. The first printers adopted the same method, printing one page at a time and only on one side of the sheet; the register or collation of the quires for guide to the binder was given in the colophon (q.v. below), and only later supplanted by a signature on each quire, at first inserted by hand, and first printed at Cologne in 1472. When more than one page was printed at once, the number of times the paper had to be folded was a fair guide to the dimensions of the page, at a time when (and for ages later) the paper was made by hand, on frames whose size was held closely alike by the exigencies of human arms; and folio, quarto, octavo, duodecimo, etc., expressed not only the absolute fact of folding, but the constructive fact of size. These names were conveniently abbreviated, except the first, to 4to, 8vo, 12mo; and when improved machinery and larger sheets of paper enabled still more sheets to be printed at once, the Latin names to correspond were not used at all, the terms 16mo, 24mo, 32mo, being employed at once. All these names still survive, though—with the advent of great paper-mills and machinery which make any size desired for an edition, so long as it is an "engine run," the actual printing on large editions of 64 pages at a time, and minute calculations which figure to an eighth of an inch margin—they have ceased to express any fact worth knowing; and in the United States it is now more usual to give on catalogues the height and breadth of pages. But in Europe the old fashion still prevails. So far as the names now mean anything, a 16mo indicates the usual size of a popular volume or essay volume, and an octavo the stately and dignified memoir or volume of travel or "complete works" or cyclopædia; but in fact even these are rarely printed in less than 16s. A sheet folded in the middle forms two leaves or four pages; and a book composed of such sheets is styled a folio, whether it measure a foot and a half or four feet high. When the sheet is again folded it makes a quarto. In hand-made paper (that used in nearly all the small special editions and those of bibliographical interest) the water line runs either across or down the page, according to the number of foldings. The following scheme is serviceable: Folio, folded once, 4 pages, water line perpen-

dicular; quarto, twice, horizontal; octavo, four times, perpendicular; duodecimo, six times, horizontal; 16mo, horizontal; 18mo, perpendicular; 32mo, perpendicular; 36mo, 48mo, 64mo, horizontal; 72mo, 96mo, perpendicular. In Great Britain for a long period printing paper was chiefly of three sizes—royal, demy, and crown; and the book was large or small according to which was used. Demy was the commonest, and the demy octavo was the established form of standard editions. Among books as among men there are giants and dwarfs. The British Museum has the largest and the smallest in the world. The former is an atlas seven feet high, of the 15th century, completely concealing a tall man between the pages, with a binding and clasp which make it look as solid as the walls of a room; the latter is a tiny "bijou" almanac less than an inch square, bound in red morocco, easily to be carried in the finger of a lady's glove. Certain church books in the Escorial are described as six by four feet; and the "Antiquity" volumes of the Napoleonic 'Description de l'Egypte' are $37\frac{1}{2}$ inches high. The Thumb Bible or Toy Bible, on the other hand, was one by one and a half inches; it was not really a Bible, but an abstract, printed in 1693 and dedicated to the Duke of Gloucester, and repeatedly reprinted. Hoepli's 'Divina Commedia' (1878) is less than $2\frac{1}{4}$ by $2\frac{1}{2}$ inches; and Pickering's diamond edition of Tasso measures $3\frac{1}{2}$ inches high by $1\frac{1}{8}$ wide.

Colophons.—These originated with the Assyrian scribes in the 7th century B.C. at latest: Ashurbanipal's in the Nineveh library put at the end of the last column of their cylinders a register of the documents composing the "book." The early printers followed the same style, using the last paragraph of the last page—now called by English bookmen the colophon (Greek, apex or terminus), by French the *souscription*, by Germans the *schlusschrift*—to give details about the book, which we should now assign to the title page, or merely for a sort of *envoi* or "send-off." The usual terminus of books was "Explicit," "Hic Finis," "Finis," "Here Endeth," or something of the sort; but some printers expanded it into elaborate epilogues or postfaces. Caxton is notable for this; see examples in Blade's 'Caxton,' and for others see Legrand's 'Bibliographie Hellénique' (1885). With development of the title-page, the colophon disappeared, though instances are found well into the 16th century.

Title-Pages.—It is curious that while the early development of printing ran to enormous and elaborate title-pages, Caxton has none at all, except one to a work not certainly his, 'The Chastising of God's Children' (?1491); and even that contains only three lines of ordinary print. But in Venice as early as 1474 a 'Calendario' by John de Montereigio was issued by Pictor, Loslein, and Ratdolt, with a quaint rhyming title-page, with place, date, and names at the foot. A facsimile is given in Bouchot's 'The Printed Book.' The treatment of the title-page has varied enormously with different periods. In the 16th and 17th centuries it was at its worst: the object apparently being to make it a digest of the entire contents of the book, (Nares' 'Life of Burleigh,' of which Macaulay says that "the title is as long as an ordinary preface," is a mild example in the 19th), and half destroying the very object of the title by

making it difficult to wade through and come at the real theme. Frequently it gave a laudatory description of the book, a plan which if adopted to-day would save the reviewers the trouble of reading the preface: "A Book Right Rare and Strange," "Very Necessary to be Known," "Very Pleasant and Beneficial," etc., are familiar to the student of early printing. Modern titles are thought to violate both good taste and good business judgment in going beyond a short plain sentence or name; but they sometimes do worse by misleading the cataloguer, as when Ruskin's 'Notes on the Construction of Sheep-folds' is classed among works on live stock. Double titles, as where a sub-title is given of a seemingly different purport from the main one, are also perilous. As to the frequent practice of reissuing an old book under a new title, it is pure fraud, wasting the money of libraries and private buyers on what they have already or do not want, throwing catalogues out, and making confusion all around. The punishment of using a title already appropriated, even unknowingly, is direct and by law, for the title of a book is protected by law as much as any other part of the contents. For the lore and facsimiles of title-pages, see Andrew Lang's 'Old French Title-Pages' in 'Books and Bookmen'; Le Petit's 'Principales Editions originales d'Ecrivains français' (1888); and Könnecke's 'Bilderatlas' (1887).

Dating of Books.—One of the most exasperating traits of the early printers, like the monkish scribes, was its rarely occurring to them to put dates to their books. Only five out of 21 of the known works of Colard Mansion, Caxton's master, are dated, and more than two thirds of Caxton's own are dateless. On the other hand, in the colophon to the 'Moral Proverbs' and in the 'Book of the Knight of the Tower,' the dates are set down with excessive minuteness, even to the month and day. Modern publishers only fail to date a work when it is out of date and the fact is to be concealed from the buyer; a common deception of the trade is to reissue an old work with a new title-page and usually a new copyright date, sometimes shifting the introductory matter so as to change the pagination or "folioing." The usual and now universal date is either by Roman numerals (an antiquated annoyance it would be better to abolish), or by Arabic numerals, which for some inscrutable reason are held a trifle underbred. In the earlier books some queer freaks are indulged in. One is to put Roman lower-case numerals before some of the capitals as multipliers; unfortunately, others use exactly the same as signs of subtraction, and others still use capital letters as subtractors, so that the reader's guess needs confirming from outside. For example:

M CCCC iiijXX VIII (1498: $1000 + 400 + 4 \times 20 + 8$).
 M iiijC iiijXX Viiij (1488: $1000 + 4 \times 100 + 4 \times 20 + 8$).
 M iiijD (1496: $1000 + 500 - 4$).
 M IIID (1497: $1500 - 3$).

Sometimes the early printer used odd chronograms, or titles in which a date is expressed by the numeral value of the letters contained in or marked in it; in some cases repeating in this a date already given on the title-page. For instance, 'De spIrItaLI IMItatIone ChrIsl saCræ et VILes pILs In LVCeM Datæ a R. P. Antonio Van den Stock Societatis Jesu, Ruræmundæ, Apud Gasparem du Pres'—a

book with two chronograms on 1658 in the title, but a superfluity in the centre, and containing in the text over 1,500 on the same date. Two modern volumes of chronograms are Hilson's (1882 and 1885).

The date is often determined approximately by the water-marks on the paper; but this is one of the most persistently forged of all things, and demands the greatest knowledge and judgment.

Place of Publication.—This is not always instantly apparent even when printed, as the various local forms and their varied Latinizations or the use of obsolete terms often make a bewildering complexity for a single place; or a punning or pseudo-classical translation may be used, not a true ancient form; or the same Latin or Greek form may mean one of two or three places; or it may be used expressly to throw the inquirer off the track. The latter is of course undiscoverable except by outside evidence, which however is forthcoming in a surprising number of cases. The motive may be anything from sincere religious or patriotic zeal to the most bestial criminality; most "shady" modern literature has either no assigned place of publication or a false one, and some are "published" an immense distance from where they are printed—a common enough thing in legitimate publication in modern times, though practically unknown in early ones, printer and publisher being the same. Hundreds of European books are nominally published at Pekin, or Tokio, or Calcutta; the unsavory products of Parisian presses are usually fathered on some Dutch or Belgian city; and Sir Richard Burton's unexpurgated 'Arabian Nights' was accredited to Benares, India.

The following list of un-English forms of the chief centres of past publication will be useful (for a full one, see 'Dictionnaire de Géographie Ancienne' (Paris 1870):

Argentoratum: Stras-	Gippesvicum: Ipswich.
burg.	Gratianopolis: Gré-
Augusta, Augusta Vin-	noble.
delicorum: Augs-	Hafnia: Copenhagen.
burg.	Hala: Halle.
Basilea: Basle.	Herbipolis ("plant-
Bipontum: Deux-	town"): Würzburg.
Ponts, Zweibrücken.	Enetia (Greek): Ven-
Bnezieh: Venice.	ice.
Bononia: Bologna or	Holmia: Stockholm.
Boulogne.	Insula or Insulæ ("the
Cadomum: Caen.	Isle," l'Isle): Lille.
Cæsaraugusta: Sara-	Irenopolis ("City of
gossa.	Peace"): Berœa,
Cantabriga: Cam-	properly, but used as
bridge.	a disguise name.
Ceulen: Cologne.	Ispalis: Seville.
Civitas Tricassina:	Keulen, Kuelen: Co-
Troyes.	logne.
Colonia, Colonia Agrip-	Leodicum: Liège.
pina, in civitate Col-	Leucopetra ("White-
loniensi: Cologne.	stone"): Weissenfels.
Corona: Cronstadt.	Lipsiæ: Leipsic.
Cuelen: Cologne.	Lugdunum: Lyons.
Dordrechum or Dor-	Lugdunum Batavo-
tracum: Dort.	rum: Leyden.
Eboracum: York.	Lutetia: Paris.
Eleutheropolis ("Free-	Massilia: Marseilles.
town"): Freistadt,	Matisco: Macon.
Francavilla, Franche-	Mediolanum: Milan.
ville, etc. Also a	Mleczi, Mljetka, Mne-
disguise name.	zik: (Slav.) Venice.

Moguntiacum: Mainz.	Regiomontium
Mons Regalis: Mon-	("Kingsmount"): Königsberg.
dovi.	
Mussipons: Pont-à-	Rotomagus: Rouen.
Musson.	Sarum (i. e. Saria-
Neapolis: Naples.	bariæ): Salisbury.
Neapolis ("Newtown")	Tarvisium: Treviso.
Casimiriani: Neu-	Tornacum: Tournay.
stadt on the Hardt.	Trajectum: Utrecht.
Enipons: Innsbrück.	Trecæ: Troyes.
Olisipo: Lisbon.	Tridentum: Trent.
Oxonia: Oxford.	Turoni: Tours.
Petropolis: St. Peters-	Ulisipo, Ulyssipo,
burg.	Ulyssopolis: Lisbon.
Probatopolis ("Sheep-	Ultrajectum: Utrecht.
town"): Schaff-	Venetia, Venetia, Ven-
hausen.	ezia, Venedig, Wenez
Pontimussum: Pont-à-	(local dialect): Ven-
Musson.	ice.

Pagination.—Books were printed at first exactly like manuscripts, without numbering the pages. Soon the unhandiness of this method, and the difficulty of making references, forced a numbering of the leaves; which was shortly succeeded by numbering the pages, and in some cases—of very large, closely printed books—by numbering the columns, which is occasionally done for like reasons in modern times. Books of more than one volume are usually paged separately, but in many large sets the paging is carried consecutively from beginning to end, especially where it is likely to be issued in more than one edition and divided into differing numbers of volumes; since in that case one index will answer for all, instead of having to be made over for each. In the old folios and quartos, letters were often inserted on the margin, to break the page or column into separate portions without interfering with the continuity of the text; these marginal references from the first editions of classics are often left in the modern editions, forming a convenient method of reference from one to the other. Essentially the same method is followed in some modern books, but usually by numbers instead of letters, dividing off the text into tens and fives of lines, for convenient citation and reference; in some editions of the Bible the chapters and conventional verses are marked off in the same way, to keep the original paragraphing and continuous narrative and yet be easy of comparison with the common Bibles.

Prefaces, Dedications, etc.—An introduction is properly a part of the body of the text, outlining its theme and the main divisions of the argument or narrative, or setting forth the general conditions from which the special theme is isolated and enlarged for study; the *preface* (for which among certain ultra-Teutonists the disagreeable affectation "foreword," German *Vorwort*, is substituted) is properly the author's introduction of himself or his work to the reader, explaining his general purpose, the need or place of his book, personal thanks, or comments, etc., and all such matter as needs to be stated yet is not pertinent to the exact subject. In old times it was like the prologue or epilogue to a play, a method of ingratiating one's self with the reader, bespeaking his indulgence or removing any unfavorable impressions with which he might begin the book; and was addressed to the "courteous reader" or the "gentle reader" (which properly meant an assumed *feminine* reader), etc. The *dedication*, in times

BOOK CLUB

when there was no general book-market and an author must depend on the patronage of some person of rank (that is, down to the 18th century, and well into that), was an integral and indispensable part of the book: it meant that the author asked the patron to give him money and place in return for being celebrated, just as the old chiefs did their bards. He must have his *Mæcenæ*; without him he would starve, with him he could disregard the masses. Sometimes, with men of hard, bold natures and a keen scent for the worst side of human life, like Martial or Aretino, they used disguised (very little disguised) threats and virtual blackmail as a supplement to appeal, and fawned and snarled alternately. In those times it was often nauseous with fulsome laudation; it is now of the simplest form, a mere survival used to express the author's liking or gratitude for some one, or acknowledgment of inspiration or encouragement, or in humorous books often a joke like the text.

Printers' Emblems.—These are the "book-plates" of the publishers, used not to imply ownership of the copies, but the credit of the work. They have been treated by Berjeu in 'Early Printers' (1866), by Silvestre in 'Marques Typographiques' (2 vols. 1867), and there was an old work of Roth-Scholtz (Nuremberg 1730); it has also been touched on by John Hill Burton in his 'Book-Hunter.' Among them may be cited the three-masted ship of Mathis van der Goes of Antwerp, 1472-94; the windmill of Andrew Myllar, Edinburgh, 1508 and later; the curious wild men and fruit-laden tree of Thomas Davidson of Edinburgh, in 1541; the Stephensens' olive-tree, and the Elzevirs' sphere. Often there is a punning allusion to the publisher's name; Froschover (*frosch* in German is frog) has frogs; Le Chandelier, a seven-branched candlestick; and Nicholas Eve has a picture of Eve giving Adam the forbidden fruit. Others use instead the armorial bearings of their cities; Leeu, the castle of Antwerp; R. Hall, Geneva's half-eagle and key on a shield; Stadelberger, the lion rampant of Heidelberg, and the diapered shield of Zurich. Ascensius, 1462-1532, has a most vividly accurate representation of his great printing press, with a pressman pulling a proof. His device bore the inscription, "Prelum Ascensianum"; and it was adopted by Jossé Bade of Paris, 1501-35, who added his initials at the foot; by De Gourmont, 1507-15; Le Preux, 1561-87; and in a modified form by De Marnef, 1567, and De Roigny, 1565. The Aldi had an anchor and a dolphin, which was employed by Turrisan, De Chenney, Brillard, Tardif, and Coulombel—sometimes, as in Coulombel's case, with the divided Aldus.

Decoration.—Besides the illustration of the text by pictures, either as frontispiece or interleaved, there are certain artistic forms which are merely decorative accessories to the book as such. The title-page may have some of its lines or letters printed with colored inks; the printer's emblem or some suitable vignette may be inserted; or even the whole title may be engraved, as often in the 16th and 17th centuries, when it was frequently an exceedingly elaborate and costly affair, and in some modern *éditions de luxe* these engraved title-pages are works of extraordinary beauty. There are also ornamental initials, as with the illuminated manu-

scripts; head and tail pieces, in the blank at the head of a chapter or the space left at the end. The first printers often left the initial letters off altogether, or put in a small one as a guide to the artist, who inserted them by hand, using red ink, from which he was called a *rubricator*; he also used his taste in other decorative details, being in fact the illustrative artist of the time.

Technical Terms.—The sale and collection of books are too large subjects to be treated here, but a few of the names used in the second-hand book trade may be mentioned. "Unique," "rare," and "very rare," are intelligible as names, but need judgment in their acceptance. A book may be unique because it was not worth keeping, like disused text-books; the term does not imply any special value. Or it may be so because the original edition was limited to enhance its value, a very common device. In all such cases there must be knowledge and sense to estimate properly the intrinsic or factitious worth of the book. "Edition" means nothing whatever; properly it should mean all the issue of a book that the publisher thinks the market will bear at one time, and once it did mean that, but it has long ceased to have any definite connotation. As above, the "edition" may be artificially limited to a small number of copies with a promise to destroy the plate; on the other hand, a popular novel may sell many thousands and each thousand be called an "edition," so that it may be said to have passed through 50 "editions." "Thousand" is the honestest word, and is now more used by the large houses. "Curious" is a euphemism for a much less dainty word. "Foxed" means damaged by brown or yellow spots. "Uncut" does not mean that the leaves have not been opened with a paper-knife, but that the original size of the leaves has not been cropped by the binder. The French use *non coupé* for the former, and *non rogné* for the latter.

Book Club, a private association printing books for a limited number of subscribers. The members are usually learned men, and in this way render accessible rare books and manuscripts. The earliest of these clubs was the Roxburgh Club, whose work was not important. Other English clubs of this sort have done excellent and valuable work, among them the Camden Society, whose publications relate to English history, the Percy Society, the Hakluyt Society, and the Early English Text Society.

In America there were in Colonial and Revolutionary times a number of literary societies which published the writings of their own members; such was the Junto founded by Franklin. The first association established for the purpose of publishing was the 'Seventy-six Society' formed in 1854, whose publications relate to the American Revolution. This society existed for three years only, and was followed by 'The Club' in New York, and by the Bradford Club. In 1858 The Prince Society of Boston was established, and it still continues its work of publication. From 1858 to 1876 a large number of clubs were formed whose work was neither important nor valuable. In 1876 the Brooklyn Historical Printing Club was established. It has done most excellent work on historical lines. The foremost of all American clubs of this sort is the Grolier Club of New York, formed in 1884 with 50 members, now numbering about

400. Its publications are of a literary and bibliographical character and are noted for their elaborate and artistic make-up.

Book-lice, wingless members of the family *Psocida*, order *Platyptera*. These minute insects would be easily mistaken for aphides, both the wingless as well as the winged individuals. Their bodies are oval, the head free from the prothorax, which is small and partially concealed by the unequal wings. The eggs are laid in patches on leaves, bar, or other objects, and are covered with a web. *Atropos divinatorius* is a small pale, louse-like insect, seen running over books and in insect cases, where it does considerable injury. It is one of the worst museum pests, especially injurious to the smaller lepidoptera. The same habit is also possessed by the well-known *Psocus domesticus*. Another species of atropos, probably *pulicarius*, has been found in Missouri, infesting the egg-mass of the cottony maple scale (*Pulvinaria innumerabilis*). See DEATH-TICK; DEATH-WATCH.

Book-scorpion, or **False-scorpion**, an arachnid animal of the family *Chernetida*; known by its large maxillary palpi, like the scorpion's claw. The abdomen is 11-jointed, flattened, without any appendage, and the living forms are minute; they breathe by tracheæ. They are found running about dusty books and in dark places and feed on mites and Psoci. They are often found attached to the leg of some fly or other insect by which they are transported about. The female chelifer bears the eggs, 17 in number, in a little bunch under her abdomen. Meuge has observed a pseudo-scorpion cast its skin in a light web made for that purpose, where it remained five days in the web after its metamorphosis, and did not assume its dark colors for four weeks; three months after it returned to the same web for hibernation. Meuge describes eight species from the Prussian amber, belonging to genera still living, and Corda one (*Microlabris sternbergi*) from the coal formation in Bohemia, an inch long. Schiödte has found a curious blind species in the caves of Adelsburg, and several kinds occur in American caves. In chelifer there are no eyes. *C. cancroides* is dark brown, with many short spines on the thorax.

Book-selling. The earliest history of book-selling is extremely obscure. The tablets and cylinders of Assyria and Babylonia will be found treated under Book, and the article BOOK OF THE DEAD should also be consulted. About the middle of the 6th century B.C., is found in ancient Athens an approximation to a systematized book-trade as it has been understood in modern times. Pisistratus, with funds from the municipal treasury, paid scholars for preparing a standard text of Homer and Hesiod for copyists' use. The books then made were very costly. Diogenes Laërtius states that for three books of Philolaus (q.v.) Plato paid three Attic talents (\$3,240), money being then, of course, worth far more than it now is. The first book-sellers prepared by their personal labor the scrolls they sold; then capitalists came to employ and organize staffs of copyists. About 250 B.C. Alexandria became one of the great book-centres of the world. In this it was favored by having at its disposal the scholars of the university and the facilities for distribution which the commerce of Alexandria afforded. Skilled scribes were also

carefully trained there. The book-trade of Rome commenced about the 2d century B.C. Slaves who could write Greek were rated highly. The great publisher of Cicero's time, Atticus, is well known. His editions were famed for their accuracy under the name *'Antiqua'*. In addition to his central publishing house he had distributed in various portions of Rome and in provincial centres, tabernarii, or retail dealers. Horace's publishers were the Sosii in the Vicus Tuscus. Argiletum, Martial says, was the street of the book-sellers, as it was, likewise, of the tailoring shops of fashion. By the close of the 1st century A.D., the Roman book-trade was extensive and well organized. Papyrus was imported in great quantities from Egypt, and large staffs of copyists were kept busy preparing editions of various works, the average edition for the general public running from 300 to 1,000 copies. Very considerable shipments were made to the provinces.

During the Middle Ages book-making and selling belonged to the monasteries. The different monasteries transcribed the particular manuscripts treasured in their libraries, and their editions came to have a peculiar value, depending upon the character of the original text and the accuracy of the copy. At the beginning of the new learning, the manufacture and sale of books passed to the universities, within which the manifolding of MSS. was done by an organized guild. Outside the universities, however, there was a considerable trade in MSS., beginning with the end of the 14th century. The invention of printing naturally revolutionized the book-trade. The publications of Gutenberg, Fust, Froben of Basel, Aldus Manutius of Venice, Estiennes (Stephani) of Paris, Caxton of Westminster, Plantin of Antwerp, and the Elzevirs of Leyden and Amsterdam, are well known. For further information, see the article BOOK, above referred to; and AMERICAN PUBLISHING.

Book-worm, the "book-worm" of librarians is probably the larva of a boring beetle (*Anobium paniceum*) one of the family *Ptinida*. These worms are small white grubs like those of weevils, which live in various drugs, dried meat, etc. It also burrows in hard biscuits, resulting in the weevily biscuits complained of on ship-board. It more commonly bores in old furniture, causing it to be "worm-eaten." These grubs become the beetles known as "death-ticks" or "death-watches" (q.v.). See the various works on entomology and Blade's 'Enemies of Books.'

Book of Days, The, a noted work edited by Robert Chambers, 1863. It has for its subtitle 'A Miscellany of Popular Antiquities in Connection with the Calendar.' In bringing it out the editor expressed a desire to preserve interest in what is "poetical, elevated, honest, and of good report, in the old national life"—recognizing the historical, and even the ethical, importance of keeping this active and progressive age in touch with obsolescent customs, manners, and traditions. Beginning with 1 January each day of the year has its own curious or appropriate selection, and its allowance of matters connected with the Church Calendar, —including the popular festivals, saints' days, and holidays,—with illustrations of Christian antiquities in general.

BOOK OF THE DEAD

Book of the Dead, The.—The literal translation of the hieroglyphic title is: "Coming



PERT EM HR—U

Forth by Day." Modern Egyptologists have adopted the name given by Lepsius: *Das Aegyptische Todtenbuch*, "The Egyptian Book of the Dead." That title, however, is considered unsatisfactory, for the simple reason that it is not one single book dealing exclusively with funeral ritual, but is a collection of books and chapters treating of psychostasia in the "Double Hall" before Osiris; the peregrinations of the *Ka* in the "valley of the shadow of death;" the Osirian doctrine of resurrection, etc.

No better laconic definition of the Book of the Dead can be given than that of the late Sir Peter le Page Renouf. He says: "It is not a book in the usual sense of the word; it is not a literary whole, with a beginning, middle and end; it is a mere unmethodical collection of religious compositions (chapters) as independent of each other as the Hebrew Psalms."

Part of the Book of the Dead is of remote antiquity, dating back to the pre-dynastic period. There are numerous late copies of it in the museums of Europe and of this country, but the best and most complete copy is the Papyrus Ani, in the British Museum. It contains one hundred and eighty-six chapters, and is beautifully illuminated; and, although about 3,400 years old (belonging to the XVIII Dynasty), it is well preserved. A fac-simile of that Papyrus was published by order of the trustees of the British Museum, and translated (1895) by the eminent Egyptologist, Dr. E. A. Wallis Budge. Several excellent translations have been made into French, German, and English of various papyri of the Book of the Dead. There are several versions of the book extant. That of Heliopolis, which was subjected to numerous modifications and recensions, is considered the most ancient; then the Theban version of which the Papyrus Ani is an example—dating from the middle of the XVIII Dynasty. These two versions are written in hieroglyphics, in vertical columns and in cursive linear style. Two other versions of a later period are written in hieratic as well as in hieroglyphic characters. Complete translations of the Book of the Dead were made by Birch, Brugsch, Pierret, Pleyte, Massy (Davis, from the French translation by Pierret), Le Page Renouf, and Budge.

The style of writing and the vignettes, representing embalming, funeral processions, weighing of the heart, etc., have undergone great changes in the course of time, and the texts of some of the Theban school in the XVIII Dynasty differ materially from later productions; i. e., the Papyrus Ani (Theban recension), contains one hundred and eighty-six chapters, and the Turin papyrus, of a later period, contains only one hundred and sixty-five chapters.

The late Sir Peter le Page Renouf, for many years keeper of the Egyptian antiquities in the British Museum, says: "Out of many manuscripts which are extant, no two contain

exactly the same chapters or follow exactly the same arrangement."

The earliest texts, before the XVIII Dynasty, are fragmentary, inscribed on the walls of tombs, monuments, sarcophagi, mummy cartonnages, etc. The plate is one of the numerous presentations upon the walls of the Egyptian tombs of that period, many of which have been faithfully reproduced in the magnificent volumes of the *Description de l'Egypt*, and in Lepsius, etc. It represents part *a* of tomb XXIV, now in the Sepulchral Chamber of the Royal Museum, Berlin, showing Prince Merab, son of Khufu, the builder of the great Pyramid of Gizeh (about 4000 years B.C.) enjoying himself after his beatification with the same good things he was accustomed to have in his former life.

The sum and substance of the Book of the Dead is chapter CXXXV, generally considered the most ancient. It is always connected with a vignette, which depicts the beatification of "The Osiris," in the presence of the presiding deities in Amenti, when the "Negative Confession" and the weighing of the heart of the dead before the supreme deity in the netherworld takes place.

Before proceeding with the description of *psychostasia*, it is necessary to say a few words concerning the deities taking part in the weighing of the heart in the supreme tribunal of Osiris, called "The Double Hall," represented in this plate.

The name which every dead Egyptian assumed was that of the chief deity of Amenti, called "Osiris." As Osiris was considered the type of life after death, it was only natural that in the development of their mythology he should become the chief god of Amenti—the Justifier of the dead.

Osiris, according to Egyptian legend, was a prehistoric king, the embodiment of goodness. His brother, the wicked Set, becoming envious, treacherously killed him, cut the corpse in pieces and hid them in different parts of the land. Osiris' sister-wife, Isis, accompanied by her sister Nephthys, collected the scattered parts, which were then embalmed by the god Anubis. By means of magic, which Thoth, the god of letters and science, taught Isis, she resuscitated the body. Finally, Horus, son of Osiris and Isis, avenged the death of his father, by engaging Set, or Typhon, in combat and killing him. In the course of time Isis, Horus, etc., came to be considered as gods, and Osiris became identified with *Tum*, the setting sun, symbolizing death; and Horus on the horizon (Her-em-khu, sometimes called Her-em-Khuti), the type of birth and resurrection.

Thus the *Ka*, whilst wandering through the regions of darkness and molested by demons, is the dead Osiris. After the weighing of his heart and if found not wanting, he is beatified and obtains new life. He is no more Osiris the dead, but Osiris Horus, the resurrected.

Plate *b* represents the weighing of the heart in the tribunal of the netherworld, *Amenti*; presided over by the supreme deity Osiris (*Ausar*). On the extreme right and left of the hall are two massive pillars, carved to imitate bundles of lotus stalks, fastened together near the top of the column. The deceased at the entrance to the hall is in an adoring attitude; his uplifted arms are supported by *Maat*, the goddess of truth and justice. She is always



MERCHANT KENNA WEIGHED IN THE BALANCE IN THE
DOUBLE HALL OF JUSTICE



MERCHANT KENNA JUSTIFIED

present in the Judgment Hall and is represented headless, with an ostrich feather in place of the head. Her figure, sometimes only the feather of her headgear, is placed in the scale-pan, opposite the one containing the vase with the heart.* The jackal-headed Anubis and the hawk-headed Horus superintend the weighing. In the scale-pan to the right is the weight in the shape of the goddess *Maat*. This scale is adjusted by another divinity un-named in the hieroglyphic text. In the scale-pan to the left is a jar containing the heart of the departed. Upon the beam of the balance sits the dog-headed ape deity called *Hapi*. The little figure seated on the crook to the left represents the new birth after the justification of the "Osiris." Close to the balance stands the ibis-headed scribe *Thoth*, with his tablets, recording the result of the weighing. Close in front of him, upon a shrine, sits the adversary (the Egyptian *Cerberus*), called in hieroglyphics *Amemut*, the devourer of the dead, in the shape of a strange being composed of three beasts: hippopotamus, lion and crocodile, ready to destroy the *Ka* in case he should, after weighing, be found wanting. Immediately facing the throne is an altar full of sacrifices, consisting of bread, geese, onions, lotus flowers, buds, and burning incense. Beneath the altars are jars containing wine and other liquids for oblations. At the head of the hall is Osiris himself, sitting upon a throne which is richly decorated with *ankhs*, emblems of life, and *was*, emblems of purity. He is closely shrouded, and wears the white crown of Upper Egypt, called *Atef*, ornamented with two ostrich feathers, the symbols of truth and justice; his hands crossed upon his breast, on his wrists are bracelets. He holds in his right hand the *Nekhekh*, scourge; and in his left, *Hek*, the crooked staff, symbolical of justice. Above are the forty-two divine assessors, seated in two rows of twenty-one each, with different type of head, such as the heads of apes, serpents, crocodiles, etc., adorned with the feather representing truth and justice, and each holding in his hand a sharp-pointed knife. The *Ka* of the deceased stands, in beseeching posture, with hands raised, in front of each row of the judges.

The same chapter (125) contains the confessions of the deceased. Every one of the forty-two judges whom the deceased called by their proper names had to pronounce him innocent, he emphatically affirming before each of them in turn that he did *not* commit any of the forty-two sins. The negative confession is very interesting but space forbids the mentioning of more than a few of them. The judge having to consider the crime of theft was addressed by the deceased as follows: "O Devourer of Shades, coming out of the orbits . . . I have not stolen;" another was addressed: "O Eyes of Flames, coming out of the shrine . . . I have not played the hypocrite;" "O Cracker of Bones, coming out of *Suten Khem* (Bubastis) . . . I have not told falsehoods;" "O Swallower, coming out of *Khnem* . . . I have not blasphemed;" "O Eater of Hearts, coming out of the thirty . . . I have not made conspiracies;" "O Eye in the Heart, coming out of the land of *Sahu* . . . I have not defiled the river," etc.

Among other sins denied are: "I am not sluggish; I have not made to weep; I am not a landgrabber; I committed not adultery; I am not a slayer of man; I tamper not with the balance; I do not cheat," etc.

Howsoever absurd the Egyptian Pantheon may appear to our eyes, we must acknowledge from the evidence of these forty-two confessions, that they possessed a superior code of morality, a code which included not only our decalogue, but much of the ethical teachings and humanity of modern civilization.

The vignettes of this chapter, as we have already remarked, vary. The finer illuminated papyri made for royal personages or high priests and priestesses are exquisitely illuminated and the texts are unabridged. For instance, the Papyrus of *Nu* is more than sixty-five feet long. The Papyrus of *Ani* is seventy-eight feet long by one foot and three inches wide.

Most copies of the Books of the Dead are defective, others betray gross ignorance on the part of the scribe or copyist. The common people who were unable to purchase a well-written and illuminated text for their dead had to be satisfied with a cheaply, badly written, abridged copy. The scribes must have possessed a large stock of blanks on hand, containing spaces to be filled with the deceased (Osiris') name. Some of the Egyptian scribes were as dishonest as most of the embalmers. As the papyrus was to be placed with the mummy, the mercenary scribe or embalmer substituted a spurious for a good one.

SAMUEL A. BINION,

Author of '*Ancient Egypt or Misraim.*'

Book of Mormon, a collection of 16 distinct books believed to be written at different periods by successive prophets. Prophetic and historic in treatment, its style is very like that of the common English translation of the Bible, portions of which, to the number in all of 300 passages, are incorporated as they are in the Bible. It constitutes the scriptures of the members of the Church of Jesus Christ of Latter-Day Saints. Joseph Smith, an American of Manchester, N. Y., testified that he heard in 1823 the Angel Moroni reveal to him in visions that the Bible of the Western Continent was buried in a box near his residence. This, according to his own account, he at length found—a volume six inches thick, with leaves of thin gold plate, eight inches long by seven broad, bound together with three gold rings; on which leaves was a mystic writing that he characterized as reformed Egyptian. With the book he professed to have found a pair of spectacles, by means of which he was able to read the contents, which he dictated to an amanuensis. This book consists of an alleged history of America from 600 a.c., when Lehi and his family (descended from the dispersion after the building of the Babel tower) landed in Chile. Between the descendants of Nephi, Lehi's youngest son, and the offspring of his older brothers, who are the North American Indians, long conflicts waged; the Nephites finally being almost annihilated. There remained a fragment, among whom were Mormon and his son, Moroni. They collected the records of their people, and buried them in the hill of Cumorah, on the Divine assurance that they would be found by the Lord's prophet. Besides this history, the book, as it finally was received, has various moral and religious teachings. It was

* Many of the Pharaohs adopted her name in their royal titles, i. e., Ramesis II styled himself *Se Ra Umr Ma*, "Son of the Sun, the Keeper of Truth."

BOOK OF NONSENSE—BOOKBINDING

claimed by enemies of the faith that one Solomon Spalding, a Presbyterian preacher, wrote a historical romance in 1809, which a compositor, into whose hands it fell, sold to Smith, and that this became the 'Book of Mormon,' to which additions were made. This claim was afterwards disproved. See MORMON.

Book of Nonsense, A, a nursery classic by Edward Lear. It is made up from four minor collections published at intervals during a long life. The author began as an artist; colored drawings for serious purposes were supplemented by others for the amusement of the groups of little ones he loved to gather around him; and the text added to them has proved able to endure the test of time without the aid of drawing, and much of it has become part of the recognized humorous literature of the language.

Book of Snobs, The, a series of sketches by William Makepiece Thackeray. It appeared first in 'Punch,' and was published in book form in 1848. The idea of the work may have been suggested to Thackeray when, as an undergraduate at Cambridge in 1829, he contributed to a little weekly periodical called the 'Snob.'

Bookbinding, the art of arranging, fastening together, and covering sheets of paper composing a book, including the ornamentation or decoration of the covers. Following the use of rolls of papyrus or wax-covered tablets, leaves of parchment were introduced, and it became necessary to fasten or bind them together. This improvement in form is, on somewhat doubtful authority, attributed to Attalus II., king of Pergamus, about 150 B.C.

The monks were the early bookbinders, up to the time of the invention of printing, and examples in the British Museum dating as far back as 700 A.D. illustrate the great labor bestowed on their most precious manuscripts.

All the early specimens were bound in heavy boards, strong metal clasps, and bands, and the material used in covering varied from the parchment and iron to ivory, enamels, and jeweled silver and gold.

The invention of printing made a great change in the art of bookbinding, the delicate, beautiful specimens, the workmanship of Jean Grolier and many nameless Italian and French binders employed by Grolier, Macoli, and others contrasted strikingly with the rather clumsy, inartistic work of the monks.

It was not until 1820 that cloth was introduced as a covering, invented, it is said, by Archibald Leighton, one of the most enterprising and successful of London binders. In the 'Bookseller' of 4 July 1881 there is an interesting account by Robert Leighton of the invention of cloth by his father. The embossing of bookbinding cloth was suggested to the late Mr. de la Rue, and was carried out so admirably by him, with the appliances he possessed for embossing paper, that his process remains comparatively unaltered. The desired pattern was engraved on a gun-metal cylinder, and transferred, in reverse to one made of compressed paper, strung upon an iron spindle, and turned in the lathe the exact circumference of the gun-metal one, and these two being worked together in a machine, and the pattern transferred from one to the other, the cloth was passed between them and received the impress of the pattern.

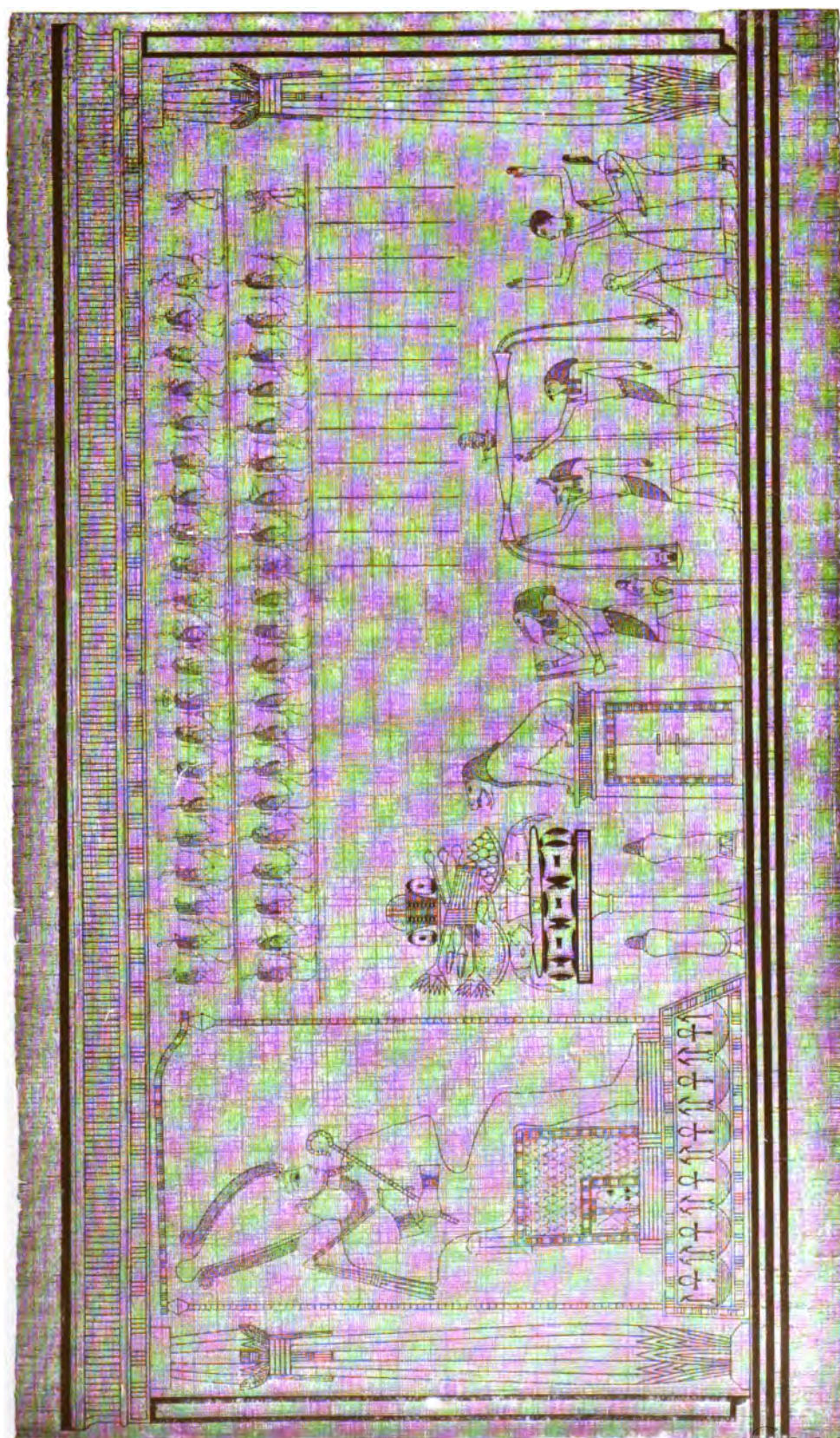
Extra work and edition work are the two classes into which bindings may be divided. Extra work bound with greater care, and largely by hand methods, forming a small portion of all books bound. Edition work being the binding of quantities, principally by machinery.

The following description will apply to extra work, and methods in vogue do not differ greatly from the process of hundreds of years ago, although the use of the press and plow, hammer and backing boards is giving way to the trimming, smashing and backing machines. The first process takes the sheets from the printing press, folds them in sections of 8, 16 or 32 pages, done generally by a girl pressing each fold down with a bone folder in such a manner that the pages come in consecutive order. If a book contains 320 pages it will be seen that 20 sections or signatures are required to complete it. When all the sections are folded, they are gathered up in order and collated, that is, examined to see that each signature follows in proper sequence. Smashed or hammered, the book is then ready to sew.

Throughout the world in binderies given up to extra work will be found a frame of peculiar make called a sewing-bench. On this is stretched bands or cords of soft twine in a vertical position, and to these the signatures are attached by passing the needle and thread through the middle of the signature and around each band or cord, and the raised bands showing on back of book inform how many cords the book has been sewn on, although in many cases grooves are sawed in the back of the book into which the cords fit, and false bands are pasted on back to show the raised band effect.

The book is taken down from the sewing bench and an inch or more of twine is left on each side to be later laced through holes punched in the boards. Before this is done the marble or colored linings are pasted on the front and back of book inside the first fly leaf. Leather or cloth joints in some cases are added.

The book is then trimmed in a cutting or trimming machine; formerly the edges were trimmed by a knife called a plow while the book was clamped firmly in a press. Before cutting the back is struck forcibly against an iron plate, to square up the signature, then placed against gauge, set to position desired and clamped, knife descending and cutting book while under pressure. After trimming the three sides the book is again carefully knocked up and a thin coating of glue, sometimes flexible in character, is well rubbed in between signatures, for unless this is done the signatures will show a tendency to split open, where one signature joins another. The book is then rounded by drawing or shaping the curve, at same time beating in a peculiar manner with a flat-faced hammer, then clamped in pair of jaws, and the joints drawn over by repeated taps of hammer, or in some shops by a heavy roller set in a machine called a backing machine, which clamps the back under treadle movement. Many extra forwarders round the book before trimming, then knock the round out. After cutting, the book will spring back to its former round, leaving the front concave. In most particular classes of work the boards are laced to book before it is cut. The book is now laced to boards forming the cover and the ends of cords glued down on



JUDGMENT OF THE DEAD.

BOOKBINDING

the inside of the cover. If the edges are to be marbled, gilt or colored, they must go through that process before books are rounded.

Marbling.—Prepared colors are thrown in a shallow trough containing gum tragacanth, on which the colors float and spread as desired. The pattern is formed by various combs that mingle the colors. The edges of the book are dipped into the liquid just deep enough for the colors to adhere, and when removed from trough, a sizing is drained over the edges, removing the surplus gum and fastening the colors more securely to edge. After edges are thoroughly dry they may be burnished with an agate or stone burnisher. Gilding is done by laying thin sheets of gold leaf on the edges of books previously scraped and smoothed with steel scraper and fine sandpaper, and sized heavily with a preparation of white of egg. When dry it is then burnished with bloodstone, flint and agate burnishers.

Colored Edges.—Mix aniline colors with alcohol, adding a little ammonia to drive color in, spread over surface of edges with a fine sponge. If desired, then clamp in press and burnish. The book is then ready for the headbands, linings and cover. The headbands are merely ornamental, and are woven with a colored silk, by machine or made over cords with muslin. The older process was to work over a piece of parchment with colored silks and partially fasten to back of book in the weaving or sewing. The back is then lined with strong paper glued on, the amount of stiffening varying with the size of book and style of binding, most books being made with loose backs on which false bands are glued.

Coverings.—The leather cover is dampened and covered with paste, then drawn smoothly over and turned in, over boards which have previously been laced to the book. After leather has dried, clean out joints and paste against covers the lining papers.

Finishing.—Artistic taste of the highest order finds employment in this branch of bookbinding, and an expert finisher must be at once artist and craftsman of much ability. The ornamentation and lettering of fine bindings all are done by hand, the finisher bringing into use many tools and ornaments, cut on brass and fastened into small wooden handles, much depending on the manner of cutting and shaping the tools. The leather must first be prepared with paste wash and a glair or sizing generally made from the white of an egg, over which the gold leaf is laid, and the tools which are heated over a gas burner are then impressed on the gold leaf, the surplus gold being brushed off with a piece of crude rubber. Upon the most careful preparation of leather, the proper heat of tools, and the tooling of book before sizing is too dry, depend the brilliancy or gloss of the impression.

Ornamentation without gold is called "blind tooling" and is produced by rubbing or stamping the hot tool on the dampened leather. Few books bound now have such a wealth of ornamentation and so great an amount of time given to the finishing as was common in Grolier's time, although there are still many novel effects produced by the use of inlaid colored leathers, miced leather, etc.

After the period of Grolier, the taste for magnificent binding in France ran riot and

many indulged in most sumptuous bindings, and designs were prepared under the superintendence of the most celebrated artists.

During the 16th and 17th centuries bindings were produced in England which compared favorably with the contemporary masterpieces of French, Italian, and German bibliography, but in the 18th century England took the leading place in the workmanlike forwarding and artistic finishing of books.

EDITION WORK.

So slow was the process of hand folding, 2,500 signatures of three folds being a fair day's work, a single sixteen folding machine was built with steel points set about fifteen inches apart, over which the sheet is placed, registered exactly on the points, or holes punched into the sheet as it was being printed, a knife descending makes first fold, carrying through rollers to gauges, when the second knife drops, forcing sheet through second roller, and third knife likewise, making three complete folds, and dropping them in a trough at the rate of ten thousand a day, or in other words, one machine doing the work of four hand folders.

It was soon found possible to build double 16-folding machines doing nearly 20,000 sheets daily, and at present in some of the larger edition binderies, special machines have been built which will take a sheet nearly 40 x 60 inches in size, and will turn out 40,000 signatures of 16 pages each, equivalent to the work of 16 girls folding by hand.

When the books are found complete, they are put through a powerful machine called a smashing machine, which compresses and makes solid the book, then to the sewing machine, where each signature in turn is laid over the arms, is carried to a position under a row of curved needles, punches concealed within the arms first make an incision through which the curved needle carries a thread meeting a looper which fastens each stitch. The first and last sheet is pasted before they are placed over the arms, and when finished the book is cut apart from the following book, and the thread is held by the pasting of signature, from unraveling.

Following the sewing, books are re-smashed, the linings and cloth joint pasted in and books are ready for trimming. If it is to be marbled or gilt, the back is tipped with glue to keep the signatures from getting out of square or becoming irregular.

Trimming.—To remove the rough and uneven edges of the signatures, the book should be cut or trimmed. This may be accomplished in the straight cutter, a machine using one knife which, making a clean, smooth cut, descends while book is clamped, in some machines with a hand clamp, in others, automatically. This machine, while very satisfactory in its results, has given way for the trimming of editions of books to automatic trimmers of various makes, which, unlike the process of trimming in the straight cutter, trims the edges of the top, front and bottom of book without removing from machine. An improvement on the automatic trimmer is a machine using two knives with each cut of machine, and while the output of this machine is very large, there has just been installed in one of our large school-book binderies, a continuous cutter which permits the books to be

BOOKKEEPING

constantly fed into the machine, and the output is so large, the machine is in a class by itself.

After trimming and gilding, marbling or coloring, it is glued over back with thin coating of glue well rubbed in between the signatures to prevent the breaking between signatures, which, while not taking from the strength of binding, looks as if poorly bound; just before glue is dried too thoroughly, book is fed against the gauges of the rounding and backing machine, the front rolls of machine drawing or rolling the round under pressure, then carried to back part of machine where a backing plate rotates against the back and forms the joints. This machine will do the work of six to eight men.

After the process of rounding and backing, headbands are prepared by forming muslin over a cord or twine; the backs of books are thoroughly glued, headbands affixed at top and bottom of back, crash lining cut to extend about one inch or more over the joints, is rubbed on with a bone folder, heavy manila paper is then glued against the book and well rubbed in, after which books, when thoroughly dried, are ready to case in, or in other words, put in the covers which have previously been prepared.

Boards called binder's boards are cut in rotary cutters to proper size for books; cloth is cut sufficiently large to overlap about one half to three quarters of an inch, and fed over a cylinder which, revolving, carries it against glue rollers, which place a thin coating of glue thereon. This glued piece of cloth is carried to a certain part of machine and awaits the laying thereon of boards and strip of back lining paper which has been forwarded by a clever device from the rear part of machine. Grippers then carry it through rollers after end and side slides have turned in the cloth over the board, and a rubber belt delivers it on stand completely finished.

Stamping.—The ornamentation of both cloth and leather covers for most bindings other than single books or single sets is rapidly and neatly accomplished by a process called stamping. Stamping was introduced to overcome the difficulty in hand tooling the cotton cloth and principally for reason of the need of a much cheaper and quicker method for lettering and ornamenting the increased quantities of books sold when the muslin or cloth was introduced as a binding for books.

The process of casing, as it is called, consists in pasting the outer end leaves of a book, placing in proper position on cover, and cover then is drawn over and book shifted to secure evenness of squares or margins, then built up on press boards with brass rims which press into the joints, and after several hours' pressure, sufficient time being given to thoroughly dry, the books are removed from press, opened up and examined, wrapped and boxed for delivery.

EDWIN S. IVES,

Of Edwin Ives & Sons, New York.

Bookkeeping is the recording of the transactions of a business so that the resources and liabilities may be readily exhibited. Transactions are recorded in the order of their occurrence in such books of original entry as may be imposed by the nature of each business or which conform to the requirements of the accounting system in use. If but a single book is used for this purpose, its form is usually that of the

day-book, which contains a narrative of all the transactions as they occur. Formerly this was the general procedure, but it is found that business can be expedited by classifying the transactions in separate books, consequently the cash-book, purchase-book, and sales-book are now commonly used concurrently. Whatever may be the character and extent of the original records, the transactions are ultimately transferred in classified form to the ledger, which is the principal book of accounts. There are two systems of bookkeeping in use, namely, single and double entry. The primary element in each of the two systems is the Account. In bookkeeping by single entry only accounts with persons are kept in the ledger, and the profits and losses are ascertained solely by comparison of past with present conditions; in other words, by taking the difference between the net worth at the beginning and the net worth at the close of a stated period. The principal books used in single entry are the day-book, cash-book, and ledger. Being a simple though necessarily imperfect method, single entry is used chiefly by retail traders. Bookkeeping by double entry, as the term implies, is that mode in which every transaction is entered twice, first on the debtor side of one or more accounts, and next on the creditor side, thereby keeping the ledger perpetually in balance. The chief objects of keeping accounts, it may be stated, are to determine (1) the amount of profit or loss during a definite period, and (2) the amount of net capital or net insolvency at the end of such period. The system of double entry gives the net capital or net insolvency in two different ways, from two different sources, the one corroborating the other, and constituting what is called the balance of the books. Upon the classification resulting from this arrangement rests the claim of double entry bookkeeping to be considered as a science.

Bookkeeping, like most other sciences, has adopted a terminology of its own to avoid circumlocution. For example, the terms debtor and creditor, usually abbreviated Dr. and Cr., are used arbitrarily to designate the right-hand and left-hand side, respectively, of an account. An account is a collection of items, under an appropriate title, so arranged as to give a result by comparison.

Journalizing is the mental process of deciding how every transaction is to be disposed of in the ledger; that is, what accounts are to be debited and credited in each case. Posting is the transferring of debit and credit items to their proper accounts in the ledger. A trial balance is a list of the open accounts in a ledger together with the debit and credit footing of each account. A business statement is a summarized exhibit of those accounts which comprise all items of revenue, otherwise denominated a profit and loss account. A financial statement is a compilation of those accounts having to do with capital, in other words, a balance sheet. A balance sheet is a condensed statement of the resources and liabilities of a business. It is usually compiled from the trial balance and inventory schedules at the end of a fiscal period and it is frequently accompanied with a profit and loss statement which confirms the increase or diminution of finance as displayed in the balance sheet proper. The function of a balance sheet is,

BOOKKEEPING

therefore, to present a scientific statement of the financial condition of a business at a specified date.

The problem presented in bookkeeping, as may be inferred from the foregoing, is that of exhibiting financial transactions as they occur in the most minute detail, and ultimately in the most condensed form. The best solution of this problem in any given instance, depends largely upon the nature of the individual business the operations of which are to be recorded.

The advantages of the double entry system over the single entry system may be summarized briefly as follows: (1) The susceptibility of infinite modification in its minor features without disturbing the general results as shown in the balance sheet; (2) the constant equilibrium of debits and credits, the mathematical proof of which is afforded in the trial balance; (3) the separate classification of capital and revenue accounts, the resultant statement of each class being confirmatory of the accuracy of the other; (4) the displaying of the channels through which profit and loss items have accrued, thus revealing the methods by which the movements of the business have been financed; (5) the provision for the ascertainment of gross profit on the different departments of a business by means of the trading accounts; (6) the working economy resulting from the introduction of special columns in the books of original entry; and (7) the ease with which a thorough audit can be conducted at any time, this circumstance serving as a check upon erroneous entries.

A double-entry ledger, as before stated, is the book of accounts. As such it is a concrete expression of the principle of classification, and the philosophic basis of the "science of accounts" is displayed therein with mathematical precision. Each separate account contained in the ledger is built up on the theory of comparison. Thus, the items of one side denote increase or plus of financial ability, those of the other side denote its decrease or minus. Hence, to know the proper place in the ledger in which to assign each item in a transaction, is to know the laws, principles, and objects of each account in the ledger; and a false entry can only be proved false by showing its want of conformity to some principle of the ledger. Take the cash account for illustration: The left-hand or debit side contains the items of cash received; and the right-hand or credit side the items of cash disbursed; the difference between the receipts and payments will, necessarily, be the balance or amount of cash on hand, which, in this case, can be confirmed by actual count. Again, the merchandise account shows on the debit side the value of the goods on hand at the beginning and the cost of all subsequent purchases; the credit side shows all returns or sales of such goods, to which is added the value of the goods on hand at the end; the difference or balance, being the excess of production over cost, or of cost over production, as the case may be—in other words, the gain or loss. Each separate account, therefore, is constructed in accordance with a fixed and unalterable plan and each contributes a definite result which must be considered in the final showing. Being based upon the theory of the equation, there follows a double record of each item in every account with the result that the total debits always equal the total credits when the several accounts are taken

together. It should be noted in this connection that finance, only, is the essential object of accounts, namely, cash, notes, book debts, or their equivalents; any other property is only introduced into the books to show how far it contributed to the increase, or occasioned the diminution of finance, and so to corroborate the actual amount of financial ability found to exist. The great and almost the only source of confusion in double entry is that of confounding an account kept to show financial ability with an account to ascertain how much the profit on some property dealt in has contributed to whatever augmentation may be found in the state of the finances after a certain period of business.

It will be apparent that two distinct ideas are concurrently promulgated through all movements of the business directed toward an increase of wealth. These two ideas are concentrated in the cash and merchandise accounts, respectively, as types of the two classes of accounts. These two classes of accounts have been denominated, business and financial: the former revealing the movements of the business, the latter its financial results. In other words, business accounts show the losses and gains, and financial accounts show the resources and liabilities. Thus it will appear that the debits of the financial accounts show an increase of wealth and the credits decrease, and that the business accounts simply show the same thing reversed. Accordingly, the sum of all the resources of a concern less the sum of all its liabilities is its net capital. All increase or diminution of net capital comes from the receiving of more or less for property than its cost or the appreciation or depreciation of property while in possession, or from rent, interest, taxes, and service. The net gain or net loss of a concern, therefore, during any specified period must be exactly equal to the increase or decrease of net capital during the same period. In a manufacturing concern, for example, it is important that the progress of the business be shown at frequent intervals. It should be possible at any time to ascertain the cost of production of each article manufactured and to verify this cost by a statistical comparison with previous costs. This implies (1) that such a system of stock-keeping be inaugurated as shall show the amount of material consumed in the process of manufacture; (2) that the expenditures for labor be shown for each of the successive steps essential to bringing the article to a completed condition; (3) that costs of superintendence and incidental shop charges be pro-rated; (4) that the general expenses be distributed among the goods manufactured; (5) that adequate provision be made for depreciation; (6) that specific reserves be set aside for bad debts, taxes, contingencies, etc., and (7) that final profit shall be based on the total inclusive cost of production. The application of scientific principles to the accounting system should enable the management to have placed periodically before it, such facts relating to the cost of production as are essential to the shaping of a successful policy in these times of intense industrial competition.

The manner of recording transactions before they are arranged in the ledger, varies in almost every business, but this variation presents no confusion whatever when the different accounts embodied in the ledger are thoroughly under-

BOOKKEEPING

stood. Double-entry accounting, in fact, admits of a great variety of modifications, erroneously, in many cases, called systems. The so-called voucher system, for instance, now extensively used in railway and manufacturing corporations, is an expedient for eliminating from the ledger individual accounts with creditors. At the same time, by the device of special columns in a voucher register, it facilitates the most minute subdivision of revenue expenditures and renders periodic comparison of such items possible to any degree desired. In most lines of business special columns may also be introduced in the cash-book, sales-book, and journal for the purpose of minimizing the mechanical labor of posting, the aggregate of each column being transferred to the corresponding ledger accounts instead of the separate items. The principle of consolidated postings is applied in dividing the accounts of the general ledger among a series of subordinate ledgers, a com-

Loose leaf and card ledgers, impression sales-books, duplicate order blanks, and the many mechanical devices for the curtailing of labor or the securing of expediency or directness in recording, do not come within the limits of this discussion which is intended rather to give a general view of the subject and its underlying principles.

Auditing.—Broadly stated, it is the province of the accountant to devise the accounting system and to specify the nature and character of the records that shall be kept; it is the duty of the bookkeeper to perform the routine work of recording the transactions of the business in accordance with the plan outlined by the accountant; it is the function of the auditor to examine critically the completed records of the bookkeeper, to compare the entries with the documents, to ascertain if the plans of the accountant have been strictly followed, and, finally, to prepare the profit and loss account and certify

FORM OF DAY BOOK.

New York, July 1, 1903.

Joseph Hardcastle began business this day with the following resources and liabilities:					
Cash on hand,		6000			
Bills receivable, note signed by B. F. Williams,		4000			
Elston E. Gaylord owes him on account,		2500			
Stock of goods on hand at present value,		5000			
Total resources,			40	17500	40
Bills payable, for note favor Charles W. Haskins,		8400			
Leonard H. Conant for amount owed him on account,		2850			
Total liabilities,				11250	
Joseph Hardcastle's net capital,				6250	40
	2				
Bought of Henry R. M. Cook on account					
200 bush. potatoes @ \$1.10,				220	
	3				
Received cash for B. F. Williams' note now due,				4000	
	4				
Sold Edgar M. Barber on account at 30 days,					
60 bbls. apples @ \$3.50,		210			
400 bush. corn @ 80c.,		320		530	
	5				
Received from Elston E. Gaylord, cash in full of account,				2500	
	6				
Lent O. P. Kinsey, cash, receiving his note at 90 days					
with interest at five per cent,				1000	

mon division being: general, sales, and purchase ledgers. Each of these ledgers can be made self-balancing, if desired, by means of special columns in the books of original entry, a controlling account being kept in the general ledger, representing the aggregate sums in each of the subordinate ledgers. A separate ledger can thus be appropriated, if the magnitude of the business demands it, to the names beginning with each letter of the alphabet, or any number of letters may be included in one, as A to K, A to G, etc. By this means separate duties may be assigned by the accountant to a large number of subordinates, the general ledger consisting of but few accounts, from which, however, he is enabled to show promptly the condition of the entire business. A private ledger is kept by some proprietors for the purpose of withholding from subordinates certain information. The difference between the total debits and credits of the private ledger accounts should complete and confirm the general trial balance. Capital, profit and loss, investments, and other accounts can be kept in this manner with perfect security.

to the correctness of the balance sheet. It is incumbent upon the auditor to exercise every faculty and means in his power to determine (1) that the liabilities are all stated; (2) that the resources are not overstated; (3) that the profit and loss account contains all expenses chargeable to the period under review; (4) that the profits earned are all included; (5) that proper charges against revenue have not been capitalized; and (6) that intentional errors, irregularities, and fraudulent entries have not been permitted. The professional duties of the competent public accountant and auditor, therefore, cover a wide range of technical knowledge and commercial experience. A large number of text-books on elementary bookkeeping have been published, principally for schoolroom instruction. For a broader treatment of the subject application for special reference books may be made to members of the State Societies of Certified Public Accountants and the American Association of Public Accountants, or the following works may be consulted: Lisle, 'Accounting in Theory and Practice'; Dicksee, 'Auditing'; Broaker, 'American Accountants' Manual';

BOOKKEEPING

Dawson, 'Accountants' Compendium'; 'American Business and Accounting Encyclopædia'; Gottsberger, 'Accountants' Guide for Executors'; Arnold, 'Complete Cost Keeper'; Miller, 'Cost Accounts'; Keister, 'Corporation Accounting and Auditing'; Metcalf, 'Cost of Manufactures'; Lewis, 'Commercial Organization of Factories'; Matheson, 'Depreciation of Factories'; Whinney, 'Executorship Accounts'; Garcke & Fells, 'Factory Accounts'; Norton

and Feasey, 'Newspaper Accounts'; Soule, 'New Science and Practice of Accounts'; Fischer, 'Railway Accounts and Finance'; Norton, 'Textile Manufacturers' Bookkeeping.' It is proper to state that in the preparation of this article the undersigned is also indebted to the writings of Mr. Thomas Jones and to suggestions from Prof. Joseph Hardcastle, two of the ablest writers on accounting that America has produced.

EDGAR M. BARBER

EDGAR M. BARBER.

Certified Public Accountant.

FORM OF JOURNAL.

New York, July 1, 1903.

L.F.		L.F.		L.F.	
2	Cash,	6000			
3	Bills receivable,	4000			
9	Elston E. Gaylord,	2500			
5	Merchandise,	5000	40		
15				8400	
12	Bills payable,			2050	
1	Leonard H. Conant,			6250	40
	Joseph Hardcastle,				
	2				
5	Merchandise,	220			
11	Henry R. M. Cook,			220	
	3				
2	Cash,	4000			
3	Bills receivable,			4000	
	4				
12	Edgar M. Barber,	530			
5	Merchandise,			530	
	5				
2	Cash,	2500			
9	Elston E. Gaylord,			2500	
	6				
3	Bills receivable,	1000			
2	Cash,			1000	

FORM OF CASH BOOK (DEBIT SIDE).

[illegible]

FORM OF CASH BOOK (CREDIT SIDE).

[illegible]

FORM OF LEDGER ACCOUNT.

MERCHANDISE.[illegible]

BOOK-PLATE

FORM OF BALANCE SHEET. — COMPANY JULY 1, 1903.

<i>Resources.</i>	\$	\$	<i>Liabilities.</i>	\$	\$
Cash on hand, Cash in bank, Stocks and bonds, as per Schedule A, Properties as under: Land, per Ledger valuations, Buildings, per Ledger valuations, Plant and machinery, less depreciation, Inventory of stock, valued by Mr. — as under: Raw material, Goods unfinished, Goods manufactured, Sundry trade debtors as under: Bills receivable as per Schedule B, Accounts receivable, as per Schedule C, Less reserve for discounts, Prepaid charges as under: Insurance premiums, Rent for July, 1903,			Mortgages payable, Interest due and accrued, Sundry trade creditors as under: Bills payable as per Schedule D, Accounts payable as per Schedule E, Capital stock, Reserve for — Surplus,		

Book-plate, a printed or engraved label, usually decorative, placed on the inside cover of a book as the owner's symbol. In a certain sense, any individualized label is entitled to the name; but as usually understood, the term is restricted to those with some special artistic design, which, however, may range from the simplest to the most elaborate and ornate composition. The elements are — the owner's name; his coat of arms if he has one, usually, but not invariably; allegorical emblems or compositions; landscape designs; mottoes; quotations, etc. In purpose they are probably very ancient: some of the small tablets found in Assyrian libraries are intelligible only as book-plates, and they are accredited to Japan in the 10th century. Indeed, something of the sort may almost be predicated of any society where books circulate much. But our modern book-plates are of German descent, and seem to have been nearly contemporaneous with printing, one being mentioned as of the mid-15th century; the earliest actually known, however, is a hand-colored heraldic wood-cut of about 1480, in some books and manuscripts presented to the monastery of Buxheim, Swabia. The earlier ones were all mere indices of ownership, rough wood-cuts with no artistic design; they were permanently raised into the domain of an art by the great Albrecht Dürer (1471-1528), the "father of the book-plate." He made two for Bilibald Pirckheimer, probably before 1503 — one a mixture of armorial and allegorical elements, and the other a large bold portrait of the famous Nuremberg senator; but his earliest dated one is for Hieronymus Ebner of the same city, in 1516. Several of the great German artists of that age — Holbein, Cranach, Amman, and others — designed book-plates; indeed, since Dürer's time the best have not disdained this branch of art, and wealthy collectors have vied with each other in costly designs.

The idea was soon adopted in other European countries. The French wrought with great delicacy and beauty, but with too elaborate and profuse decoration. The English were very late in adopting the fashion: the number of examples which have come down from before the Restoration is singularly few, and the first engraved one we possess is that of Sir Nicholas Bacon, father of the Chancellor, dated 1574; though an old folio volume from Henry VIII.'s library, now in the British Museum, contains

an elaborately emblazoned drawing which formed the book-plate of Cardinal Wolsey, with his arms, supporters, and cardinal's hat. But after the Restoration they multiply so rapidly that owing to the great number of wealthy English collectors, they far outnumber all the rest of the world, and some of them have considerable historical interest. Pepys had several, one with initials and crossed anchors probably as early as 1668, one with his portrait not earlier than 1685. Among other English names highly prized by book-plate collectors may be mentioned Bishop Burnet, William Penn, Robert Harley, Matthew Prior, Lawrence Sterne, David Garrick, Horace Walpole, John Wilkes, and Charles James Fox. Among the artists who have engraved them are those of William Marshall and Robert White, Hogarth, Bartolozzi, Bewick, and Vertue. Bewick at one time was regularly employed in their production. One of the prettiest of book-plates is that designed in 1793 by Agnes Berry for the Hon. Mrs. Damer, and engraved by Francis Legat.

The style of design, naturally, has varied with the taste of the age, and is no mean index of its characteristics. The chief English styles have been classified by Lord de Tabley, the leading modern authority, as follows: Early English, entirely armorial, with profuse mantling, and large full-rounded curves surrounding three and often four sides of the shield. Jacobean, from about the time of James II. to 1745, with a heavy carved appearance, an even balance of proportions, always a regular outline, and often a carved molding around it which makes a massive rectangular frame — a dignified and reposeful if rather formal style. The Chippendale succeeded, lighter and more graceful, with rich curves and airy scrolls, the helmet gone, no set form of shield, and a profusion of careless sprays and garlands, etc. This degenerated with poor artists into an incongruous mass of overdone and rococo ornamentation, a heap of all the unrelated objects of nature and art and the most artificial trivialities of design, portraits, and castles, and ruined abbeys, Watteau shepherdesses and shepherds, lambs and dragons, dogs and ships, etc. About 1770 came in the Ribbon and Wreath, with a shield decorated as the name implies, much simpler and more tasteful.

The American settlers for more than a century made no attempt at book-plates of their

BOOKS

own manufacture: the richer colonists looked to England for everything, especially luxuries and articles of culture, and the others had no time or taste for superfluities. Naturally enough, most of these early plates belong in the southern colonies, where there was more of leisure and cultivation of the decorative side of life; but for the same reason, their more intimate connection with England and preference for its ways, as well as superior taste, they continued to use its book-plates almost exclusively long after American engravers were actively employed upon this branch of work. Very few of the old southern plates are of American design, and consequently they are much less valued by collectors (except for the owner's sake, as with Washington's) than the northern; though the latter are much cruder in heraldry, design, and execution. The earliest dated and signed American plate by a native engraver is that of Thomas Dering, engraved in 1740 by Nathaniel Hurd of Boston; the next is of John Burnet (1754), by Henry Dawkins, who settled in 1730-77, the best of our early engravers, though there is no doubt that an earlier one of Hurd's was that of Edward Augustus Holyoke; Philadelphia and later in New York; then comes that of Benjamin Greene (1757), by Hurd; then of the Albany Society Library (1759). Paul Revere also engraved book-plates; as did Amos Doolittle of New Haven, Peter Maverick of New York, Alexander Anderson of New York (the first American wood engraver, sometimes called the "American Bewick"), and others, in the northern States, especially around the great centres like Boston, New Haven, Philadelphia, and Baltimore. They worked mainly in the Chippendale style till it gave place to the Ribbon and Wreath, and originated no new style.

The earliest book-plates were of large size, as if made specially for folios; but a smaller size soon became general, and was used for books of all sizes. Some owners, however, have used different plates for different sizes; some of Sir William Stirling-Maxwell's were of gigantic proportions.

The collection of book-plates is a very modern amusement, but has risen to enormous proportions. The first collector known was Dr. Joseph Jackson Howard, and his collection numbered over 100,000. Sir Augustus Wollaston Franks of London had one of some 200,000, which he left to the British Museum. A German nobleman, Count Karl Emich zu Leiningen-Westerburg, had also an exceedingly fine one. A number of large and valuable ones exist in the United States, including that of the Grolier Club, which gave in 1894 the first American public exhibition of them. There is a cosmopolite association of collectors and connoisseurs, the Ex Libris Society of London (1890), issuing a monthly journal, and there are also periodicals devoted to it in France and Germany. There are regular "prices current" of book-plates among dealers, and auction sales as of books. The intelligent study of them is based on the work of the English poet John Byrne Leicester Warren, afterward Lord de Tabley, who published, in 1880, his 'Guide to the Study of Book-Plates,' which has no rival, and whose classifications are universally accepted. Special works on particular divisions, besides works in foreign languages, are, among

others, Castle's 'English Book-Plates' (1892); Hamilton's 'French Book-Plates' (1892); Hardy's 'Book-Plates' (1893); C. D. Allen's 'American Book-Plates' (1894); Labouchere's 'Ladies' Book-Plates' (1895); Hamilton's 'Dated Book-Plates' (1896); etc.

Books, Censorship of. Unless we consider the burning of condemned books under the Roman emperors as a censorship, the establishment of this institution must be attributed to the popes; but it cannot be denied that it would have sprung up in a thousand other places even if it had not existed in their dominions. Soon after the invention of printing, the popes perceived the influence which this art exerted over the diffusion of knowledge. It was besides doubly dangerous at a time when the authority of the Church had been assailed, and was shaking under the load of its abuses. They endeavored therefore to prohibit first the reading, and secondly the printing, of certain literary works. They enforced the ancient decrees of the Church against the reading of heretical books, and introduced an ecclesiastical superintendency of the press in 1479 and 1496, more completely established by a bull of Leo X. in 1515. In this the bishops and inquisitors were required to examine all works before they were printed, and thus to prevent the publication of heretical opinions. They went still farther: as this papal decree could not be carried into execution in all countries on account of the Reformation, they prepared an index of books which nobody was allowed to read under penalty of the censure of the Church. This index was commenced by the Council of Trent, in the fourth session of which (1546) the decree of the censorship was renewed; but it was not executed, and was finally left to the popes (25th session of 1563), by whom several such 'Indices Librorum Prohibitorum' have been published. Works of an established character, which could not well be prohibited, it was determined to expurgate. The Duke of Alva caused such an 'Index Expurgatorius' to be prepared in the Netherlands; another was drawn up at Rome in 1607; but there are serious difficulties in expurgating books. The papal government still continues the policy of prohibiting to the faithful the reading of works deemed dangerous, and the Congregation of the Index has still its place and functions at Rome.

In Germany the politico-theological controversies gave the first occasion for the introduction of this institution, as they were carried on with the greatest violence on both sides. The decree of the German diet in 1524 prohibited them. By the diet of 1530 a more severe superintendence of the press was established; and this was confirmed by later laws of the empire in 1541, 1548, 1567, and 1577, etc. It was also provided at the Peace of Westphalia, 1648 (Osnabr. Instr., cap. v. sec. 50), that the states should not suffer attacks on religious parties. From that time the emperors have promised, in their elective capitulations, to watch strictly over the fulfilment of this article. In the capitulations of the Emperor Leopold II., 1790, and of the Emperor Francis II., it was further added (art. vi. sec. 8), "that no work should be printed which could not be reconciled with the symbolical books of both Catholics and Protestants, and with good morals, or which

might produce the ruin of the existing constitution, or the disturbance of public peace." It was, however, not difficult in most Protestant countries for individual authors or literary journals to obtain an exemption from the censorship; and many institutions, academies, universities, etc., were privileged in this way as far as concerned their regular professors. The governments sometimes protected their subjects with great energy; as, for instance, that of Hanover, in the case of Putter and Schloezer. Censorship was first abolished in England. It was formerly exercised by the well-known Star-chamber, and, after the abolition of this court in 1641, by the Parliament. In 1662 it was regulated by a particular statute, but only for a certain number of years. This statute was renewed in 1679, and again in 1692 for two years more. In 1694 the right of the crown to render the printing of writings, journals, etc., dependent on its permission,—that is, the censorship,—ceased entirely. In Holland, and even in the Austrian Netherlands, a great liberty, if not an entire freedom of the press, prevailed. All that was not permitted to be printed in France appeared in the Netherlands or in Switzerland, at Lausanne and Geneva, to the great advantage of the Dutch and Swiss book-trade.

In Sweden, by an edict of 1766, and accordingly under the aristocratical constitution, the abolition of the censorship was ordered; yet Gustavus III., personally a friend to the liberty of the press, was obliged to retain the censorship, and even to execute it with severity, during the aristocratical machinations which disturbed his reign, and which were but imperfectly counteracted in the Revolution of 1771. Gustavus IV. issued an edict soon after he ascended the throne, by which the censorship was retained only in matters of religion, and was administered by the consistories. This, however, was not permanent; at first penalties were enacted, and in 1802 the censorship was entirely re-established, committed to the chancellor of the court, and executed with severity. French and German books were prohibited. King Charles XIII., immediately after his ascension to the throne, abolished it entirely by a provisional order of 12 April 1809, which was confirmed as an article of the constitution (sec. 86), 6 June 1809. In Denmark, by a royal rescript of 14 Sept. 1770 (under the minister Struensee), the censorship was wholly abolished; neither has it been restored, though the laws by which the liberty of the press has been regulated have been changing, and have sometimes been very oppressive. In France the censorship, which had belonged to the department of the chancellor and been administered by royal censors, was annihilated by the revolution. All the constitutions, from 1791 to the Charte Constitutionnelle in 1814, declare the liberty of the press one of the fundamental laws. During the republic there was no censorship, but the revolutionary tribunals took its place. Napoleon restored it in another form by the decree of 5 Feb. 1810 (*Direction de l'Imprimerie*). Since the Restoration it has also undergone various changes. Books of more than 20 sheets have always remained free, but the censorship has been exercised over pamphlets and journals at different periods. Under the government of the Emperor Napoleon III. the censorship was

re-established with new penalties, and is still maintained.

In the kingdom of the Netherlands the censorship was abolished by a fundamental statute of 24 Aug. 1815 (art. ccxxvi.), and this statute is still in force in the kingdom of Holland. By art. xviii. of the constitution of Belgium, 1831, it is declared that the press is free, and that no censorship can ever be established. In the German states the liberty of the press was much restrained till 1806, the state-attorney having till then had control over it. After 1814 several states abolished the censorship, though with very different provisions as to the responsibility of authors, printers, and booksellers. In accordance with the unhappy decrees of Carlsbad, 1819, and the resolutions of the German diet of 20 Sept. 1819, the censorship in all the states of the German confederation became one of the conditions of union, but only with regard to books of less than 20 sheets, and journals. These laws were repealed in 1849, but in the course of a few years they were gradually introduced, although in a modified form, and in this form they still exist in most of the separate German states as well as in the empire. In Russia and Austria there is naturally a despotic censorship. In the United States of America a censorship has never existed.

Besides the different degrees of severity with which the censorship is exercised in different countries, it may be divided into different kinds, according to the field which it embraces. (1) A general censorship of the book-trade and of the press, under which even foreign books cannot be sold without the consent of the censors, exists in Russia, Austria, Spain, etc. (Austria has, in the censorship of foreign books, four formulas: (a) *admittitur*, entirely free; (b) *transeat*, free, but without public advertisements for sale; (c) *erga schedam*, to be sold only to public officers and literary men on the delivery of a receipt; (d) *damnatur*, entirely forbidden.) (2) A general censorship of the press, extending only to books printed in the country, exists in Prussia (edict of 19 Sept. 1788; order of the cabinet of 28 Dec. 1824; law of 12 May 1851). (3) A limited censorship, only over works of less than 20 sheets, and journals, is at present the law in the states of the German empire. See PRESS, LIBERTY OF THE.

Boolak, boo-lāk', **Boulak**, or **Bulak**, an Egyptian town on the Nile, and the port of Cairo. Its site was once an island, but that part of the river which separated it from Cairo has been filled up. In 1799 Boolak was burned by the French. Mehemet Ali rebuilt it, and established extensive cotton-spinning, weaving, and printing works, a school of engineering, and a printing establishment, from which is issued a weekly newspaper in Arabic. The town contains a mosque, a naval arsenal, a dockyard, and a custom-house, and is surrounded by the country residences of numerous Egyptian grandees. An electric railway connects it with Cairo. Pop. about 13,000.

Boole, George, English mathematician and logician; b. Lincoln, 2 Nov. 1815; d. Cork, 8 Dec. 1864. Educated in his native place, he opened a school in his 20th year, and by private study gained such proficiency in mathematics that in 1849 he was appointed to the mathematical chair in Queen's College, Cork, where the

BOOM—BOONE

rest of his life was spent. In mathematics he wrote on 'Differential Equations'; 'General Method in Analysis'; 'The Comparison of Transcendents,' etc. In logic he wrote 'An Investigation of the Laws of Thought' (1854), an amplified edition of his earlier 'Mathematical Analysis of Logic' (1847), a profound and original work, in which a symbolic language and notation were employed in regard to logical processes.

Boom, in fortification, and in marine defenses, a strong chain or cable stretched across the mouth of a river or harbor, to prevent the enemy's ships from entering, and having a number of poles, bars, etc., fastened to it; whence the name; as, to cut or burst the boom. It often denotes a long pole employed to extend the sails of a ship, as the main boom, jib boom, etc. The term may also be applied to a pole set up as a sea mark to point out the channel to seamen, when navigating in shallows. The word also designates a hollow, roaring sound; as, the boom of a cannon; the reverberating cry of the bittorn. In recent years it is often used to denote a sudden rise in the market value of real estate, stocks, or commodities; an enthusiastic popular movement in favor of any person, cause, or thing; as, a real estate boom, a political boom, a boom in sugar.

Boomerang, a missile or weapon of a peculiar nature used by the natives of Australia. It is from 30 to 40 inches in length, and is made of hard wood. In shape it is curved somewhat like a scimitar or a parabola, or it may have a decided bend in the middle nearly approaching a right angle, the bend being a natural one. The breadth is usually about three inches, and while one surface is flat the other is somewhat rounded. Boomerangs are of different kinds, some being used in war, others in the chase, others for amusement. One variety can be hurled so as to turn while in the air and come back almost to the place whence it was thrown. It is this peculiarity that has made the boomerang so famous, though the returning boomerang, if not used merely for amusement, is only used to bring down birds. In throwing, the weapon is grasped by one end, and after a short run hurled straight in front. It then takes a horizontal position and revolves rapidly as it moves obliquely upward into the air. After a time it curves round, and if he so intends, comes back close to the thrower. It may move for a considerable distance horizontally at only a few feet above the ground, and then suddenly rise vertically upward with great velocity. The peculiarly irregular character of its path through the air, and the rapid change in its direction of movement, render it a very efficient weapon for killing birds. There is also a special boomerang for killing birds capable of being thrown in a straight course of 200 yards. The Australian natives often throw the boomerang in such a way as to cause it to strike the ground about 30 feet off; this is said to impart increased velocity, and the weapon may even hit the ground a second time and rebound into the air. The war boomerang is larger and heavier than that used in hunting. Weapons similar to the boomerang, or kiley, as the Australians also call it, but lacking the property of returning, have been, and still are, used by other races, notably the ancient Egyptians and the modern

Abyssinians. Sir Samuel Baker describes the latter as about two feet long, and made of a piece of flat hard wood, whose end turns at an angle of 30°. Various derivations of the word have been suggested, one connecting it with a root meaning strike or kill, and another with the native word for wind.

Bobndee, boon-dē', or **Bundi**, a native state of Hindustan, in Rajputana, under British protection; area 2,300 square miles. A range of hills running from southwest to northeast, penetrated by few passes and rising to the height of 1,793 feet, divides the state into two almost equal portions, that on the south being the more fertile. Much of the state is underwood. The chief river is the Mej, which penetrates the central range, and joins the Chambal near the northeast extremity of the state. It was much more extensive before Kotah and its territory were separated from it. The inhabitants are of the Hara tribe, which has given birth to many famous men, and, among others, to Ram Singh Hara, one of Aurungzebe's most renowned generals. The ruler is practically absolute in his own territory. Pop. (1901) 171,227. **BONDÉE**, the capital, is picturesquely situated on a steep slope in a gorge in the centre of the hills above mentioned, and its antiquity, numerous temples, and magnificent fountains, give it a very interesting appearance. It is crowned by a fort and surrounded by fortified walls. For picturesque effect its main street is almost unequalled. At its upper extremity stands the palace, built of stone, with turreted windows and battlements, supported partly by the perpendicular rock, and partly by solid piers of masonry 400 feet high. At its lower extremity is the great temple dedicated to Krishna. Pop. 31,000.

Boone, Daniel, American pioneer: b. Bucks County, Pa., 11 Feb. 1735; d. 26 Sept. 1822. He was one of 11 children. His father emigrated from England, and when Daniel was very young removed with his family from Bucks into Berks County, not far from Reading, then a frontier settlement, exposed to Indian assaults. It abounded with game, and thus, Daniel became accustomed to a life in the woods, and formed an intense love for uncultivated nature. His education was confined to a knowledge of reading, writing, and arithmetic. When he was about 18 his father removed to North Carolina and settled on the Yadkin. Here, in 1755, Daniel married Rebecca Bryan, and for some years followed the occupation of a farmer, but about 1761 his passion for hunting led him, with a company of explorers, along the wilderness at the head waters of the Tennessee River. In 1764 he joined another company of hunters on the Rock Castle, a branch of the Cumberland River. He had become dissatisfied with life in North Carolina. The customs of the colony were becoming luxurious; the rich were exempt from the necessity of labor, and the people were much oppressed by taxes. Boone imbibed a chronic hatred of law forms which lasted through life, and his neglect of these, in securing his titles to land, reduced him to poverty on more than one occasion.

In 1767 a backwoodsman named John Finley made an excursion farther west than had before been attempted, and returned with glowing accounts of the border region of Kentucky, which he represented as a hunter's paradise. Boone

headed a party of six for its exploration, leaving his Yadkin home 1 May 1769. On 7 June, in the same year, they reached an elevation from which they beheld the whole region watered by the Kentucky River and its tributaries. At this point on the waters of the Red River, a branch of the Kentucky, and supposed to be within the present limits of Morgan County, they halted and hunted until December without seeing a single Indian, although they were continually on the alert for them. They then separated into parties, Boone and a man named Stewart keeping company, and on 22 December these two were surprised and captured by Indians, who robbed them and kept them prisoners for seven days, when they managed to make good their escape. Early next month Boone and Stewart were gratified by the arrival in the wilderness of Daniel's younger brother Squire and another hunter from North Carolina, bringing tidings of the family at home and a much-needed supply of powder and lead. Soon after this event Stewart and Boone were again attacked by Indians. Boone escaped, but his companion was shot and scalped, and the man who came with Squire having perished in the woods the two brothers were left alone together. On 1 May it was decided that Squire should return for supplies, while Daniel remained to take care of and increase the store of peltry. They parted, and until 27 July, when Squire returned, Daniel remained in utter solitude, without bread, salt, or sugar. The brothers then continued their explorations over other parts of Kentucky until March 1771, when, taking as much peltry as their horses could carry, they returned to their families on the Yadkin, Daniel having been absent about two years, during which time he had seen no human beings but his hunting companions and the hostile Indians. He was now anxious to remove to Kentucky, and although his wife and children were easily persuaded to do so, two years elapsed before he could make the necessary arrangements. He sold his farm, and on 25 Sept. 1773, the two brothers, with their families, set out for Kentucky. At Powell's Valley, through which their route lay, they were joined by five families and 40 men well armed, but on approaching Cumberland Gap, near the junction of Virginia, Kentucky, and Tennessee, they were attacked by Indians and were forced to retreat 40 miles to Clinch River, leaving six of their party slain, among whom was Boone's eldest son, James. The emigrants were much disheartened, and Boone remained at Clinch River until June 1774, when Gov. Dunmore sent him a message to proceed to the wilderness of Kentucky and conduct thence a party of surveyors who were believed to be in danger from the Indians. This undertaking was successful, but no incidents of it have been preserved excepting that Boone was absent 62 days, in which he traveled on foot 800 miles. While he was gone to Kentucky the Shawnees and other Indians northwest of the Ohio River became hostile. Boone was appointed to the command of three contiguous garrisons, with the commission of captain, and, having fought several battles and defeated the Indians, he returned to his family on Clinch River and spent the next winter in hunting. He was shortly after employed by the Transylvania Company, established to purchase lands in Kentucky, to explore, mark, and open a road

from settlements on the Holston to the Kentucky River. In the face of great dangers this was accomplished, and on 1 April 1775, a site having been selected on the bank of the Kentucky River, the party erected a stockade fort and called it Boonesborough. Boone soon removed his family to the new settlements, his wife and daughters being the first white women that ever stood on the banks of the Kentucky. The winter and spring of 1776 wore away without any particular incident, as the Indians, though by no means friendly, made no direct attack. On 14 July a daughter of Boone and two female companions were captured by a party of Indians, but next morning Boone and his companions followed the trail and surprised the Indians so suddenly that they had not time to murder their captives, and the three girls were restored to their families. During the whole of 1777 Boone was employed with his command in repelling the attacks of the Indians, who were incited to the most savage deeds of cruelty by the British during the Revolutionary War. His services were of incalculable advantage to the new settlements. On 1 Jan. 1778, the people suffering greatly for want of salt, he headed a party for the lower Blue Licks to manufacture it, and on 7 February, while at some distance from the camp, he was surprised and made prisoner by a party of 100 Indians. Again in this instance his consummate knowledge of the red man's character saved him and his friends. He ingratiated himself in their regard, and obtained favorable terms for his party at the Licks, who became prisoners of war under the promise of good treatment. He knew that the Indians would march to attack Boonesborough, and that if he and his party resisted they would all be murdered and those at the fort massacred, as no warning could reach them. He was conducted to old Chillicothe, and thence to Detroit, where he was kindly received by the English commander, Gov. Hamilton. In order to baffle his captors he pretended to be very much pleased with his mode of life among the Indians, went through the form of adoption by them, having his hair pulled out excepting the scalp-lock, "his white blood washed out" in the river, and his face painted. On 16 June he went out to hunt, and when out of view, started direct for Boonesborough, more than 160 miles distant, which he traveled in less than five days. He reached Boonesborough in time to warn the garrison. All supposed him dead, and his wife, under that impression, had returned with her children to North Carolina. The fort was at once put in complete order for defense, and on 8 August it was besieged by 444 Indians, led by Capt. Duquesne and 11 other Canadians, having French and British colors. Summoned to surrender, Boone replied with defiance, and after a savage attack upon the fort the assailants, six times greater in number than the garrison, raised the siege, leaving 37 of their party killed and many more wounded. Boone was now promoted to the rank of major. In 1778 he went to North Carolina to see his family. The next year, having invested nearly all his little property in paper money to buy land warrants, and having, besides his own, large sums of money to invest for other people, he was robbed of the whole, about \$20,000, on his way from Kentucky to Richmond, where the court of commissioners was held to decide on

Kentucky land claims. In 1780 he returned with his family to Boonesborough, and in October of that year his brother, on a hunting excursion with him, was killed and scalped by the Indians, and Boone himself narrowly escaped. The Indians being exceedingly troublesome, a large party of militia was formed to follow and punish them, who, against Boone's counsel, suffered themselves to be drawn into an ambuscade, and the disastrous battle of the Blue Licks followed, in which Boone lost another son and had a brother wounded. At the close of the Revolutionary War Col. Boone returned to the quiet life of his farm and to his passion for hunting. In 1792 Kentucky was admitted into the Union as a sovereign State, and as courts of justice were established, litigation in regard to land titles commenced, and was finally carried to great lengths. From defective titles, Boone, with hundreds of others, lost the lands he possessed, with their valuable improvements, and thus after the vigor of his life was spent, he found himself without a single acre of the vast domain he had explored and fought to defend from savage invaders. Disgusted with his treatment he resolved to abandon Kentucky and move to the far West, which he did in 1795. He settled first on the Femme Osage, about 45 miles west of St. Louis, where he remained until 1804; he then removed to the home of his youngest son until 1810, and finally went to live with his son-in-law, Flanders Callaway. As the country, at the time of his removal, was under the dominion of Spain, on 11 July 1800, he was appointed commandant of the Femme Osage district; and as his fame had preceded him, 10,000 arpents, or about 8,500 acres, of choice land were marked out on the north side of the Missouri River, and given to him for his official services. This princely estate he also subsequently lost, because he would not take the trouble to go to New Orleans to complete his title before the immediate representative of the Spanish crown. Having left Kentucky in debt, he was much troubled for a while by ill success in hunting, but at length he obtained a valuable store of peltry, turned it into cash, went to Kentucky, without book account, paid every one whatever was demanded, and on his return to upper Louisiana with but half a dollar left, said that he was ready to die content. In 1812 he petitioned Congress to confirm the title to his claim of 1,000 arpents of land, which he had neglected to have done in proper form, and was in danger of losing, as he had everything else. He sought the aid of the legislature of Kentucky, and his petition was successfully urged in Congress, in requital for his eminent services. He continued to hunt occasionally as long as his strength remained, but was obliged to give up his rifle several years before his death. Chester Harding, who in 1820 painted the only portrait of him ever taken, informs us that his first sight of the old pioneer found him lying in his bunk in the cabin, engaged in cooking a venison steak on a ramrod. His memory of immediate events was very defective, but of past years as keen as ever. He was quite feeble, but able to walk out with Harding every day. This portrait now hangs in the State House at Frankfort, Ky. He died surrounded by his children and descendants, some of the fifth generation, in the 88th year of his age. On 20 Aug. 1845 the re-

mains were deposited with appropriate ceremonies in the cemetery at Frankfort. In all the relations of private life Boone was a model for imitation. In spite of his many Indian encounters he was a lover of peace, modest in disposition, of incorruptible integrity, moral, and temperate.

Boone, William Jones, American bishop. b. Walterborough, S. C., 1 July 1811; d. Shanghai, China, 17 July, 1864. He graduated from South Carolina College in 1829, was admitted to the bar, but, deciding to devote himself to a missionary life, he prepared for orders at the Virginia Theological Seminary, and was ordained priest in 1837. In order to equip himself thoroughly for his work, he took a course of medical study and received the degree of M.D. from the South Carolina Medical College. He sailed for China in July 1837; in 1844 he was chosen the first American Protestant Episcopal missionary bishop to China, and was consecrated at Philadelphia 25 Oct. 1844. The remainder of his life, save for an occasional visit to the United States for rest or health, was spent in the work of his diocese. He came to be well known for his knowledge of the Chinese language. He began his translation of the Prayer Book into that tongue in 1846, and later was one of a committee appointed to secure an accurate translation of the Bible into Chinese.

Boone, Iowa, a city and county-seat of Boone County, on the Chicago & N. W. and the Chicago, M. & St. Paul R.R.'s, 36 miles northeast of Des Moines. It is an important milling, manufacturing, and coal-mining centre, and in the vicinity are large deposits of fire and pottery clays. The chief industries are the manufacture of flour, brick, tiles, and pottery, and the mining and shipping of coal. The city has five banks, a Federal building, public library, and hospital. It was settled in 1848 and incorporated in 1866. Pop. (1910) 10,347.

Boonton, N. J., a town of Morris County, situated 30 miles from New York, on the Delaware, L. & W. R.R., the Morris and Essex Canal, and the Rockaway River. It has very extensive ironworks, to the early establishment of which (1700) the town owes its foundation. There are also manufactories of agricultural implements, paints, paper, rubber, etc. Pop. (1910) 4,930.

Boonville, or Booneville, Mo., a city and river port, capital of Cooper County, on the right bank of the Missouri River, here crossed by a fine railway bridge, 43 miles northwest of Jefferson City. It is built on a healthful site about 100 feet above the river. Its manufactures are of but little importance, but some trade is carried on. On 16 June 1861, a Confederate force under Marmaduke was put to flight here by Federal troops under Lyon. Pop. (1910) 4,252.

Boorde, or Borde, bôrd, Andrew, English traveler and physician: b. near Cuckfield, Sussex, about 1490; d. 1549. He entered the Carthusian order at the Charterhouse, London, and in 1521 was appointed suffragan bishop of Winchester. The rigor of the Carthusian discipline was too much for him, and about 1528 he obtained a dispensation relieving him from his

BOORHANPOOR — BOOTH

vow. He then studied medicine on the Continent, returning to England in 1530, but soon afterward again visited the Continent, where he studied at the chief medical schools, including those of Orleans, Poitiers, Toulouse, Montpellier, and Wittenberg. His journey extended to Rome and Compostella, and in 1534 he was again in England. His next journey was undertaken at the instance of Thomas Cromwell, in order to ascertain continental opinion about Henry VIII. In 1536 he was in Scotland, studying and practising "in a lytle vnyuersyte or study named Glasco," and he speaks of Scotchmen as deceitful, and inveterate haters of the English. During the years 1538-42 he was again on the Continent, and this time he went as far as Jerusalem. While staying in Winchester his open immorality got him into trouble, and he was afterward lodged in the Fleet Prison, London. Boorde, who jocularly calls himself Andreas Perforatus, was the author of several works, among which are the following: 'Fyrst Boke of the Introduction of Knowledge' (about 1547); a 'Handbook of Europe,' the first of its kind; a 'Dyetary' (1542); a medical treatise entitled 'Breuyary of Health' (1547); 'Boke of Berdes,' a condemnation of the beard, known only through an extant portion of a reply by another writer; a book on 'Astronomye'; an 'Itinerary of England'; an 'Itinerary of Europe'; 'Boke of Sermons'; etc. His 'Fyrst Boke' contains the first printed specimen of the Gypsy language. Many other works, such as 'The Merry Tales of the Mad Men of Gotham,' have been ascribed to Dr. Boorde. Dr. Furnivall edited his 'Introduction' and his 'Dyetary' for the Early English Text Society in 1870.

Boorhanpoor, boo-rūn-poor', India, a town of the Deccan, in the division of Nerbudda and the district of Nimar, formerly capital of the province of Candeish, on the north side of the Taptee. When viewed from the opposite side of the river it presents rather an imposing appearance. Many of the streets are wide, regular, and paved with stone; as are also the Raj Bazaar and the market-place, an extensive square, the two handsomest places in the town. The most remarkable public edifices are the Lal Kilah, or Red Fort, a palace built by Akbar, and though much dilapidated, exhibiting still many remains of imperial magnificence; and the Jumma Musjeed, or great mosque, built by Aurungzebe. A singular sect of Mohammedans, named Bohrah, have their headquarters here. They are the chief merchants in this part of India, have Arab features, wear the Arab costume, and derive their origin from a disciple of their great prophet. Boorhanpoor was formerly famous for its muslin and flowered silk manufactures, which are still carried on to a considerable extent.

Booro, boo'ō, one of the Molucca Islands, in the Indian Archipelago, west of Amboyna, belonging to the Dutch. It is oval in shape, 92 miles long, and 70 broad. It has several bays, of which Cajeli is the largest, and contains a safe harbor sheltered from the monsoons. Viewed from this bay the island has a very fine appearance. In the foreground the minarets and native houses are seen through the openings of the rich tropical vegetation; while lofty mountains, wooded to their summits, shut in the

view. The island is watered by 125 streams, large and small. On the northwest side there are vast swamps swarming with crocodiles. The island contains some high mountains—Mount Tumahu having an altitude of 8,530 feet. Booro produces a variety of valuable woods, balsams, resins, and odoriferous flowers. The chief article of export is cajeput oil, of which about \$50,000 worth is exported yearly; most being sent to Java. The tree from which it is obtained (*Melaleuca cajeputi*) grows also upon the islands of Amboyna, Ceram, Celebes, and Sumatra; but the best oil is procured in Booro. The population (about 60,000) consists of Alfoories in the interior, and Malays on the coast.

Booroojird, **Burujird**, or **Boorojerd**, booroo-jêrd, Persia, a town in the province of Luristan, capital of a district of same name, 190 miles northwest from Ispahan, with a castle and several mosques. It lies in a fertile and well-cultivated valley, yielding saffron, belonging to the Lack tribe. Pop. 20,000.

Boot, an article of dress, generally of leather, covering the foot and extending to a greater or less distance up the leg. The sandal formed the chief foot-covering among the Greeks and Romans, and it is still in common use among Eastern nations. The boot, properly so called, came into use as part of the warrior's equipment about the 14th or 15th century, and since then it has assumed many different forms. The jack-boot, a kind of top-boot not yet altogether discarded, was in common use during the latter half of the 17th century, but was to a great extent displaced by the Hessian, which in its turn has given way to more recent forms. The name was given to an instrument of torture made of iron, or of iron and wood, fastened on to the leg, between which and the boot wedges were introduced and driven in by repeated blows of a mallet, with such violence as to crush both muscles and bones. The special object of this form of torture was to extort a confession of guilt from an accused person.

Bootan. See BHUTAN.

Boötes, bō-ō'tēz ('ox-driver,' from Gr. *bous*, an ox), a northern constellation; called also by the Greeks, Arctophylax. Arcturus was placed by the ancients on his breast; by the moderns, on the skirt of his coat. Fable relates that Philomelus, son of Ceres and Jason, having been robbed by his brother, Plutus, invented the plough, yoked two bulls to it, and thus supported himself by cultivating the ground. Ceres, to reward his ingenuity, transferred him, with his cattle, under the name of *Boötes*, to the heavens.

Booth, Agnes (Mrs. JOHN B. SHOEFFEL). American actress: b. Sydney, Australia, 1846. She made her first American appearance in New York in 1865, becoming later Edwin Forrest's leading lady. She has assumed numerous famous roles with success. She has been three times married.

Booth, Ballington, general of the Volunteers of America: b. Brighthouse, England, 28 July 1859. He is a son of William Booth (q.v.), founder of the Salvation Army, with which body he was officially connected until 1896, when he seceded and founded the Volun-

BOOTH

teers, a religious body under the form of a military organization, organized in the interest of the unchurched masses.

Booth, Barton, English actor: b. 1681; d. May 1733. He was educated under Dr. Busby, at Westminster School. An early attachment for the drama was fostered by the applause he met with while performing a part in one of Terence's plays at the annual exhibition in that seminary. He ran away from school at the age of 17, and joined Ashbury's company of strolling players, with whom he went to Dublin. After performing three years in the Irish capital with great applause, he returned in 1701 to London, and, engaging with Betterton, met with similar success. On the death of that manager he joined the Drury Lane Company, and on the production of 'Cato' in 1712, raised his reputation as a tragedian to the highest pitch by his performance of the principal character. It was on this occasion that Lord Bolingbroke presented him from the stage box with 50 guineas—an example which was immediately followed by that nobleman's political opponents. Declamation, rather than passion, appears to have been his forte, though Cibber speaks of his Othello as his finest character. He became a patentee and manager of the theatre in 1713, in conjunction with Wilks, Cibber, and Doggett. He was buried in Westminster Abbey, where there is a monument to his memory. He was the author of *Dido and Æneas*, a mask, various songs, etc., and the translator of several odes of Horace.

Booth, Edwin Thomas, American actor (fourth son of Junius Brutus Booth, q.v.): b. near Belair, Md., 13 Nov. 1833; d. 7 June 1893. When 16 years of age he made his first appearance on the stage, in the part of Tressel, his father acting as Richard III. Two years later he himself successfully assumed the part of Richard in place of his father, who unexpectedly refused to fulfill an evening's engagement. The following year the two went to California, where the son remained for several years, visiting Australia meanwhile. Meeting with little pecuniary success, in 1856 he returned to the Atlantic States, and from that time forward was recognized as a leading member of his profession. He visited England (1861-2), and in 1864 produced 'Hamlet' at New York for 100 nights consecutively. In 1869 he opened a splendid theatre in New York, whose building cost over \$1,000,000, but which involved him in pecuniary ruin. He revisited California in 1876, and in the spring of 1877 was able to settle with his creditors, having earned during the season over \$600,000. Booth visited Great Britain and Germany in 1880-2, and was everywhere received with enthusiasm. He was founder and first president of the Players' Club, New York.

Booth, James Curtis, American chemist: b. Philadelphia, 28 July 1810; d. West Haverford, Pa., 21 March 1888. He graduated at the University of Pennsylvania in 1829, and in December 1832 went to Germany and entered the private laboratory of Prof. Friedrich Wöhler in Cassel, being, it is thought, the first American student of analytical chemistry to study in Germany. Later he studied in Berlin and made a practical study of applied chemistry in European manufacturing centres. Returning to Philadelphia in 1836 he opened a

laboratory for instruction in chemical analysis and applied chemistry. This soon became widely known and attracted students from all parts of the country. In 1836 he was made professor of chemistry applied to the arts in the Franklin Institute; during 1837-8 he had charge of the geological survey of Delaware, and assisted in that of Pennsylvania; in 1849 he was appointed melter and refiner at the United States mint in Philadelphia, an office he held until his resignation, 7 Jan. 1888. His studies of the nickel ores of Pennsylvania led, in 1856, to the adoption of nickel as one of the components of the alloys used in the coinage of the 1857 cent. Publications: 'Annual Report of the Delaware Geological Survey' (1839); 'Memoirs of the Geological Survey of Delaware' (1841); 'Encyclopædia of Chemistry, Practical and Applied' (1850); 'Recent Improvements in the Chemical Arts' (Wash. 1851); and he edited, with notes, a translation of Regnault's 'Elements of Chemistry' (2 vols. Phila. 1853).

Booth, John Wilkes, American actor (son of Junius Brutus Booth, q.v.): b. Hartford County, Md., 1839; d. 1865. He sided with the Confederates in the Civil War, and to avenge the defeat of their cause he formed a conspiracy against the life of President Lincoln. He mortally wounded the President while the latter was attending a performance in Ford's Theatre, Washington, 14 April 1865; in escaping from the building he broke his leg, and concealed himself in Virginia till the 26th, when, on being discovered, and refusing to surrender, he was shot.

Booth, Junius Brutus, English tragedian: b. London, 1 May 1796; d. Dec. 1852. After fulfilling engagements at Deptford, near London, and other places, and even performing at Brussels, in 1814 he made his debut at Covent Garden Theatre, London, as Richard III. His personal resemblance to the crookbacked tyrant conformed exactly to the traditions of the stage, and his personification of the character was in other respects so striking that he competed successfully with Edmund Kean, then just rising into fame. In 1821 he made his first appearance in the United States, at Petersburg, Va., and in New York, at the Park Theatre, in the succeeding year, on both of which occasions he assumed his favorite character of Richard III. From that time until the close of his life he acted repeatedly in every theatre in the United States, and in spite of certain irregular habits, which sometimes interfered with the performance of his engagements, enjoyed a popularity which a less gifted actor would have forfeited. During the latter part of his life he resided with his family at Baltimore, making occasional professional excursions to other cities. He had just returned from a lucrative tour to California when he died. The range of characters which Booth assumed was limited, and was confined almost exclusively to those which he had studied in the beginning of his career. He is most closely identified with that of Richard, in which, after the death of Edmund Kean, he had no rival. Among his other most familiar personations were Iago, Shylock, Hamlet, Sir Giles Overreach, and Sir Edmund Mortimer. In his peculiar sphere,—the sudden and nervous expression of concentrated passion,—as also in the more quiet and subtle passages of his

BOOTH—BOOTON

delineations, he exercised a wonderful sway over his audience, and his appearance upon the stage has been known to awe a crowded and tumultuous house into instant silence. His presence and action, notwithstanding his short stature, were imposing, and his face, originally molded after the antique type, was capable of wonderful expression under the influence of excitement. Several of his children inherited a portion of his dramatic talent, and became prominent actors on the American stage.

Booth, Mary Louise, American journalist and author: b. Yaphank, Long Island, N. Y., 19 April 1831; d. New York, 5 March 1889. She was widely known as the editor of 'Harper's Bazaar,' which place she held from 1867 till her death. Her 'History of the City of New York' was the first complete work upon the subject and is still probably the best. It was published in 1859, a second edition in 1867; a third, thoroughly revised, in 1880. No book has been a greater favorite of local collectors. One copy was extended to nine large volumes and enlarged by many thousand illustrations; another, owned by the author, had 2,000 illustrations inserted; and a third was extended to 22 volumes. Miss Booth's translations number over 30 volumes. They are chiefly from the French of About, Victor Cousin, Méry, Gasparin, and Laboulaye. The most pretentious is Henri Martin's 'History of France,' six volumes of which she finished.

Booth, Maud Ballington, a leader of the Volunteers of America: b. near London, 1865. She was active in the work of the Salvation Army in England, and established a corps of the Salvation Army in Switzerland. In 1887 she married Ballington Booth, and in 1896 joined him in seceding from the Salvation Army and organizing the Volunteers of America. She has been active in work for prisoners, both during their imprisonment and after their release. She is author of 'Branded' and 'Look Up and Hope.'

Booth, William, founder of the Salvation Army: b. Nottingham, England, 10 April 1829; d. London, 20 Aug. 1912. He was educated in his native town, and from 1850 to 1861 acted as minister of the Methodist New Connection. From the first he was zealous in holding evangelistic services, but the new departure which led to the creation of the Salvation Army (q.v.) on military lines began in 1865 with mission work among the lower classes in the East End of London. Since 1878 Booth's movement has been known as the Salvation Army, of which he was the mainspring and controlling power, directing its movements at home and abroad from his headquarters in London. His enthusiasm and organizing power gave life to the religious military system, of which he was "general." The property of the Salvation Army was held for its exclusive use by Booth. His wife was associated with him in the publication of several hymns and religious works dealing with the movement, till her death in 1890.

Booth-Tucker, Emma Moss, a leader in the Salvation Army: b. Gateshead, Eng., 8 Jan. 1860; d. 1903. She was a daughter of William Booth, the organizer of the "Army"; in 1880-8, she had charge of international training homes; in 1888 she married Commander Booth-Tucker, went with him to India, and in 1896 came to the

United States. She held the rank of consul in the Salvation Army, and had joint authority with her husband in the United States.

Booth-Tucker, Frederick St. George de Latour, American evangelist: b. India, 1853. He held important official posts in India, but resigned them in 1881 to join the Salvation Army. Upon his marriage with Emma Moss Booth, daughter of 'Gen.' William Booth of the Salvation Army, he prefixed Booth to his own name of Tucker. From 1896-1904 he was commander of the Salvation Army in the United States, but resigned to become secretary of all the branches of the Army outside of Great Britain.

Boothby, Guy Newell, English novelist: b. Adelaide, South Australia, 13 Oct. 1867; d. London, England, 27 Feb. 1905. In 1891 he crossed Australia from north to south, and also traveled in the East. His novels include: 'On the Wallaby'; 'A Bid for Fortune'; 'Beautiful White Devil'; 'Dr. Nikola'; 'Fascination of the King'; 'Billy Binks, Hero, and Other Stories'; 'Across the World for a Wife'; 'Pharos, the Egyptian'; 'Love Made Manifest'; 'Dr. Nikola's Experiment'; 'A Sailor's Bride'; 'A Maker of Nations'; 'My Indian Queen'; 'Farewell Nicola' (1901); and 'The Viceroy's Protégé.'

Boothia Felix, a peninsula on the north coast of North America, in which is the most northern part of the continent, Murchison Point, lat. 73° 54' N. It is joined to the mainland by Boothia Isthmus, is bounded on the north by Bellot Strait, and to the east is separated from Cockburn Island by Boothia Gulf (q.v.) It was discovered by Sir John Ross (1829-33), and named after Sir Felix Booth, who had furnished \$85,000 for the expedition. Here, near Cape Adelaide, Ross discovered the magnetic pole, lat. 70° 5' 17" N.; lon. 96° 46' 45" W.

Boothia, Gulf of, a southward continuation of Prince Regent Inlet in the northern part of Canada, lying between Boothia Felix (q.v.) on the west and Cockburn Island on the east.

Bootle, England, a municipal and county borough in Lancashire, near the mouth of the Mersey, and adjoining Liverpool, the docks of which great seaport extend into the borough, covering 370 acres and constructed at a cost of £2,500,000. The principal buildings are the town hall and municipal buildings, school-board offices, and hospital. Many churches provide for the public worship of the inhabitants. The trade of the town is almost exclusively connected with shipping, timber being the chief import; most of the American steamers have their loading berths here. There are large jute-mills, corn-mills, foundries, etc. Bootle has ample railway facilities and tramway cars. The Leeds and Liverpool Canal passes through it. There is a municipal electrical station. The history of the place is included in that of Liverpool. It was incorporated in 1868.

Boot'on, or **Bou'ton**, an island of the Malay Archipelago, separated by a narrow strait from the southeast ray of Celebes, and from the island of Muna. Area, 1,700 miles. It is high, but not mountainous, and thickly wooded; produces fine timber, rice, maize, sago, etc. The people are Malays. The sultan, who resides at Bolio, is in allegiance to the Dutch, an under-resident being stationed on the island. Pop. 17,000.

BOOTS AND SADDLES—BOOTS AND SHOES

Boots and Saddles, or Life in Dakota with General Custer, by Elizabeth B. Custer (1885). The author says that her object in writing this book, which records her experiences in garrison and camp with her husband, was to give civilians a glimpse of the real existence of soldiers in the field. Her married life was not serene; she was left in 1864 in a lonely Virginia farmhouse to finish her honeymoon alone, her husband being summoned to the front; and at scarcely any time during the next 12 years was she free from fear of immediate or threatened peril. Gen. Custer was ordered to Dakota in the spring of 1873. Mrs. Custer's book gives a lively and detailed account of their life there from 1873 to 1876, the time of the general's death. There is an interesting chapter on Gen. Custer's literary habits, and an appendix containing extracts from his letters.

Boots and Shoes. The sandal is the most ancient foot covering of which there is any record. The shoe frequently referred to in the Old Testament, and which played an important part in buying and selling, and in other social usages, was a sandal. The common sandal of the ancient Egyptians consisted of strips of papyrus plaited into a kind of mat, and that form remains the type of sandal of plaited grass or straw worn to this day by multitudes in Central Asia, India, China, and Japan. The sandal was the ordinary shoe of the ancient Greeks. In Greece shoes were used only in exceptional circumstances. Sandals were the everyday wear of the Roman populace; the patricians wore shoes of black leather; red leather shoes were reserved for the senators; and the long buskin, reaching, sometimes, to near the knee, and frequently supplied with a thick sole to add to the apparent stature of its wearer, was appropriated to tragedians and hunters. Boots are said to have been invented by the Carians. They were at first made of leather, afterwards of brass or iron, and were proofs against both cuts and thrusts. It was from this that Homer called the Greeks brazen-booted. The boot only covered half the leg; some say the right boot, which was more advanced than the left, it being advanced in an attack with the sword; but in reality it appears to have been used on either leg, and sometimes on both. Those who fought with darts or other missile weapons advanced the left leg foremost; so that in such cases this only was booted. Boots were much used by the ancients, either for riding on horseback, or walking. The boot was called by the ancient Romans, *ocrea*. The Chinese had a kind of boots made of silk, or fine stuff, lined with cotton, a full inch thick, which they always wore at home. These people are always booted; and when a visit is made to them, if they happen to be without their boots, their guest must wait till they put them on.

The Middle Ages.—Different kinds of half-boots were worn by the Anglo-Saxons and Anglo-Normans; and in the reign of Edward IV., if not earlier, the boot proper, with tops and spurs, was established as an article of knightly dress. In the reign of Charles I., a species of boot, exceedingly wide at the top, made of Spanish leather, came into use; and with Charles II. the highly decorated French boot was introduced as an article of gay courtly attire. Meanwhile the jack-boot had become indispensable in the costume of cavalry soldiers and horsemen

generally; and by William III. and his followers it was regularly naturalized in England. This huge species of boot remained in use in British cavalry regiments until comparatively recent times, and, in a somewhat polished and improved form, it is still worn by the Horse Guards. The jack-boot is almost entitled to be called the parent of the top and some other varieties. Boots with tops of a yellow color were commonly worn by gentlemen in the 18th century. Formerly in France, a great foot was much esteemed, and the length of the shoe, in the 14th century, was a mark of distinction. The shoes of a prince were two feet and a half long; those of a baron two feet; those of a knight 18 inches long.

In America.—The introduction of the boot and shoe industry in America is almost coincident with the first settlement of New England, for it is a matter of history that in the year 1629 a shoemaker named Thomas Beard, with a supply of hides, arrived on board the *Mayflower*. The pioneer of the American boot and shoe trade was accredited to the governor of the colony, by the company in London, at a salary of \$50 per annum and a grant of 50 acres of land, upon which he should settle. Seven years after the arrival of Beard, the city of Lynn saw the inception of the industry which has given it a world-wide fame, for there, in 1636, Philip Kertland, a native of Buckinghamshire, began the manufacture of shoes, and 15 years later the shoemakers of Lynn were supplying the trade of Boston. As early as 1648, tanning and shoemaking was an industry in the colony of Virginia, and history records that a planter named Matthews employed eight shoemakers upon his own premises. Legal restraint was placed upon the business of the cordwainer in Connecticut in 1656, and in Rhode Island in 1706, while in New York the business of tanning and shoemaking is known to have been firmly established previous to the capitulation of the province to the English, in 1664. In 1698 the industry was carried on profitably in Philadelphia, and in 1721 the colonial legislature of Pennsylvania passed an act regulating the materials and the prices of the boot and shoe industry. During the Revolution most of the shoes worn by the Continental Army, as well as nearly all ready-made shoes, sold throughout the colonies, were produced in Massachusetts, and we find it recorded that "for quality and service they were quite as good as those imported from England." Immediately after the Revolution, in consequence of large importations, the business languished somewhat. It soon recovered, however, and was pursued with such vigor that in 1795 there were in Lynn 200 master workmen and 600 journeymen, who produced in the aggregate 300,000 pairs of ladies' shoes. One manufacturer in seven months of the year 1795 made 20,000 pairs. In 1778 men's shoes were made in Reading, Braintree, and other towns in the Old Colony for the wholesale trade; they were sold to dealers in Boston, Philadelphia, Savannah, and Charleston, a considerable portion being exported to Cuba and other West India islands. About the year 1795 the business was established in Milford and other Worcester county towns, where brogans were made, and sold to the planters in the Southern States for negro wear. The custom at this time was for the manufacturer to make weekly trips to Boston with his horse and wagon, taking his goods

BOOTS AND SHOES

in baskets and barrels, and selling them to the wholesale trade.

Early Methods.—Prior to 1815 most of the shoes were hand-sewed, a few having been copper nailed; the heavier shoes were welted and the lighter ones turned. This method of manufacture was changed, about the year 1815, by the adoption of the wooden shoe peg, which was invented in 1811 and soon came into general use. Up to this time little or no progress had been made in the methods of manufacture. The shoemaker sat on his bench, and with scarcely any tools other than a hammer, knife, and wooden shoulder stick, cut, stitched, hammered, and sewed, until the shoe was completed. Previous to the year 1845, which marked the first successful application of machinery to American shoemaking, this industry was in the strictest sense a hand process, and the young man who chose it for his vocation was apprenticed for seven years, and in that time was taught every detail of the art. He was instructed in the preparation of the insole and outsole, depending almost entirely upon his eye for the proper proportions; taught to prepare pegs and drive them, for the pegged shoe was the most common type of foot-wear in the first half of the 19th century; and familiarizing himself with the making of turned and welt shoes, which have always been considered the highest type of shoemaking, requiring exceptional skill of the artisan in channeling the insole and outsole by hand, rounding the sole, sewing the welt, and stitching the outsole. The change from which has been evolved our present factory system began in the latter part of 1700, when a system of sizes had been drafted, and shoemakers more enterprising than their fellows gathered about them groups of workmen, and took upon themselves the dignity of manufacturers. The entire shoe was then made under one roof, and generally from leather that was tanned on the premises; one workman cut the leather, others sewed the uppers, and still others fastened uppers to soles, each workman handling only one part in the process of manufacture. This division of labor was successful from the very start, and soon the method was adopted of sending out the uppers to be sewed by the women and children at their homes. Small shops were numerous throughout certain parts of Massachusetts, where the shoemaker, with members of his family or sometimes a neighbor, received the uppers and under-stock from the factories near by, bottomed the boots and shoes, and returned them to the factories, where they were finished and sent to the market packed in wooden boxes. Thus the industry developed and prospered and was carried on without any further improvement in methods until the introduction of machinery.

Machinery.—The first machine which proved itself of any practical value was the leather rolling machine, which came into use about 1845, and with which it was said "a man could do in a minute what would require half an hour's hard work with a lapstone and hammer." This was closely followed by the wax-thread sewing machine, which greatly reduced the time required for sewing together the different parts that formed the upper, and the buffing machine, for removing the grain from sole leather. Then came a machine which made pegs very cheaply and with great rapidity, and this in turn was followed by a hand-power ma-

chine for driving pegs. In 1855 there was introduced the splitting machine, for reducing sole leather to a uniform thickness. Peg-making and power-pegging machines were soon perfected, and there had appeared a dieing-out machine, which was used for cutting soles, taps, and heels by the use of different size dies. The year 1860 saw the introduction of the McKay sewing machine, which has done more to revolutionize the manufacture of shoes, perhaps, than any other single machine. The shoe to be sewed was placed over a horn and the sewing was done from the channel in the outsole through the sole and insole. The machine made a loop stitch and left a ridge of thread on the inside of the shoe, but it filled the great demand that existed for sewed shoes, and many hundreds of millions of pairs have been made by its use. At the time of the introduction of the McKay machine inventors were busy in other directions, and, as a result, came the introduction of the cable nailing machine, which was provided with a cable of nails, the head of one being joined to the point of another; these the machine cut into separate nails and drove automatically. At about this time was introduced the screw machine which formed a screw from brass wire, forcing it into the leather and cutting it off automatically. This was the prototype of the "rapid standard screw machine," which is a comparative recent invention and is very widely used as a sole fastener at the present time on the heavier class of boots and shoes. Very soon thereafter the attention of the trade was attracted to the invention of a New York mechanic for the sewing of soles. This device was particularly intended for the making of turn shoes, and afterwards became famous as the Goodyear "turn shoe machine." It was many years before this machine became a commercial success, and mention of its progress is made later. Closely following the Goodyear invention came the introduction of the first machine used in connection with heeling—a machine which compressed the heel and pricked holes for the nails—and this was soon followed by a machine which automatically drove the nails, the heel having previously been put into place and held by guides on the machine. Other improvements in heeling machines followed with considerable rapidity, and a machine came into use shortly afterwards which not only nailed the heel but was also provided with a hand trimmer, which the operator swung round the heel immediately after nailing. From these have been evolved the heeling machines in use at the present time. Notable improvements had during this time been made in the Goodyear system, and a machine was made for the sewing of welts which was the foundation of the Goodyear machine now so universally used. This machine sewed from the channel of the insole through upper and welt, uniting all three, and was a machine of the chain-stitch type, which left the loop on the outside of the welt. This machine was closely followed by the introduction of one which stitched the outsole, uniting it to the welt by a stitch made from the channel in the outsole, through outsole and welt. This machine afterwards became famous as the Goodyear "rapid outsole lock-stitch machine." The great demand that existed for shoes of this type made it necessary that accessory machines should be invented, and those which prepared the insole, skived the welt, trimmed the insole,

BOOTS AND SHOES

rounded and channeled the outsole, as well as a machine which automatically rolled or leveled the shoe, and the stitch separating machine were soon produced. These formed the Goodyear welt system which has been the subject of constant improvement up to the present time. Factory-made boots and shoes are now entirely cut out by machinery, the upper are sewn by strong sewing machines, and soles and uppers are fastened together either by (1) sewing, (2) pegging with wooden pegs, (3) riveting with metal pins, or (4) screwing by means of the Standard screw machine. The latter most ingenious apparatus uncoils a reel of screwed brass wire, inserts it into the sole, and cuts off the wire flush with the outsole with remarkable rapidity; and for solidity and durability the work leaves nothing to be desired.

Manufacturing Methods.—The following gives a fair idea of how a pair of shoes is turned out under modern methods in the factory of to-day: First, the cutters are given tickets describing the style of shoe required; the thickness of sole, and whatever other details are necessary. From this ticket the vamp cutter blocks out the vamps and gives them with the ticket to the upper cutter, who shapes the vamps to the pattern and cuts the tops or quarters which accompany them. The trimming cutter then gets out the side linings, stays, facings, or whatever trimmings are needed. The whole is then made into a bundle and sent to the fitting department. Here they are arranged in classes by themselves. Pieces which are too heavy are run through a splitting machine, and the edges are beveled by means of a skiving machine. Next they are pasted together, care being taken to join them at the marks made for that purpose. After being dried they go into the hands of the machine operators. The different parts go to different machines, each of which is adjusted for its particular work. The completed upper next goes to the sole-leather room, in which department machinery also performs the major part of the work. By the use of the cutting machine the sides of leather are reduced into strips corresponding to the length of the sole required. These strips are passed through a powerful rolling machine, which hardens the leather and removes from its surface all irregularities. They are then shaved down to a uniform thickness, also by machinery, and placed under dies which cut them out in proper form. The smaller pieces are died out in the form of lifts or heel pieces, which are joined together to the proper thickness and cemented, after which they are put into presses which give them the greatest amount of solidity. The top lift is not added to the heel until after it has been nailed to the shoe. The remaining sole leather is used for shank pieces, rands, and bottom leveling. For the insole, a lighter grade of leather is used, which, being cut into strips and rolled, is cut by dies to the correct shape, shaved uniformly, and channeled around the under edge for receiving the upper. The counters are died out and skived, by machine, and the welts cut in strips. The uppers and soles are then sent to the bottoming department, where the first operation is that of last-ing, the uppers being tacked to the insoles. From the laster they go to the machine operator, where the upper, sole, and welt are firmly sewed together by the machine. The bottom is filled and leveled off and the steel shank inserted.

Next, the bottom is coated with cement, and the outsole pressed on it by a machine. Thence it is sent through the rounding machine, which trims it and channels the sole for stitching. From there it goes again to the sewing machine, which stitches through the welt outside of the upper. The next step is that of leveling, then heeling, both of which processes are accomplished by machinery. The heels are nailed on in the rough and afterwards trimmed into shape by a machine operating revolving knives; a breasting machine shaping the front of the heel. Still another machine drives in the brass nails and cuts them off flush with the top pieces. The edging machine is next used, which trims the edges of both sole and heel. The sole bottom is then sandpapered, blacked, and burnished by machinery, after which the shoe is cleaned, treed, and packed.

Factory Centres.—Prior to 1800 little attempt to establish the shoe industry outside eastern Massachusetts was made. Yet it was not to be expected that other enterprising sections would be content always to depend entirely on New England for so important an article of merchandise as shoes. In New York City and other cities of New York State, especially in Rochester, the industry has attained large proportions, and has reached a perfection not excelled anywhere. In Newark, N. J., where the business was early established, are made many of the finest shoes for men's wear. Philadelphia has made the shoe industry a leader among the many manufacturing industries for which she is celebrated. At Cincinnati and St. Louis ladies' shoes are produced in great quantities, and of a style and finish that have won a reputation. Chicago has taken up the business with an energy that has already placed her in the front rank. Throughout the West, including the Pacific Coast, there are many thoroughly equipped, financially successful shoe factories. Notwithstanding the enterprise of other parts of the country, New England still maintains the lead as the home of this industry. Boston is the center from which are sold nearly all the goods made in New England, amounting to about two-thirds of the entire production of the country. The flourishing New England cities and towns of Lynn, Brockton, Haverhill, Marlboro, Milford, Whitman, and Weymouths, and many others, are built up and maintained solely by the boot and shoe and allied interests. The force which this industry has exerted on the community at large becomes apparent.

Convict Labor.—No account of the manufacture of boots and shoes would be complete without reference to the employment of convict labor. The business offers many advantages to the authorities of prisons who are seeking remunerative work for the men and women in their charge. The great number of operations in producing a shoe makes it possible to use all classes of convicts, from the strong to the weak; and as far back as 1850, even before machinery was introduced, it was not an uncommon thing for houses of correction and prisons to produce footwear not only for their own convicts, but to be sold in the market. After the introduction of machinery, and during the demand for cheap shoes, which followed the close of the Civil War, many of the states leased the labor of their convicts to shoe manufacturers. In the year 1870 there were employed in this industry in 26 different States, 6,581 convicts,

while there were only 129,989 employed in the industry in the same States outside the prisons. In the year 1900 there were made by 7,609 convicts, 6,634,060 pairs of shoes, valued at \$10,990,173, and it is probable that the number employed and the annual production are steadily increasing. In States where the system was believed to have a harmful influence on the wages of the workman outside the prisons, the business has been conducted on the States' account, and in some instances, at least, the result has been disastrous.

Export Trade.—Early manufacturers shipped goods to the West Indies, more especially to Cuba, and up to the time of the Civil War the export business was prosecuted with considerable vigor and profit. In 1810 10 per cent of all the boots and shoes sold in Boston were for export. In the year 1865 shoes to the value of more than \$2,000,000 were exported. From that time the trade fell off sharply. This may be accounted for by the great advance in 1865, when values rose at least 50 per cent. Since 1895 interest has been renewed in the export trade. Manufacturers have become convinced that there is nothing in the conditions which will prevent competition with foreign countries. The raw materials are available, and, while many hides and skins are imported, the supply of the domestic product is constantly increasing and leather manufacturers have been able to produce materials for making boots and shoes as advantageously, both in regard to quality and price, as any other country. Styles have been adapted to the wants of such countries as import their footwear. Many of the leading manufacturers are alive to the situation and are endeavoring to secure a greater share of the world's trade. The following tabular statement shows the value of the exports of leather boots and shoes from 1880 to 1910:

Years	Values
1910	\$12,408,575
1905	8,057,697
1900	4,276,656
1899	2,711,385
1898	1,816,538
1897	1,708,224
1896	1,436,686
1895	1,010,228
1894	777,354
1893	590,754
1892	914,974
1891	651,343
1890	662,974
1885	598,151
1880	441,069

The exports, with the exception of the year 1865, appear to have been unimportant until 1895, when the first decided gain was made, the exports for that year being valued at \$1,010,228. Since that date there has been a steady increase until, in 1909, these exports amounted to \$12,408,575. The maximum yearly capacity of the combined factories of the United States, on a basis of 300 working days, is slightly under 400,000,000 pairs, showing that all the factories running at full capacity would require not exceeding seven months to produce all shoes consumed in the United States, and those exported for the year ending 30 June 1910.

Statistics of Manufacture.—In 1905 a capital of \$122,526,093 was invested in the manufacture of boots and shoes. This sum represents the value of the land, buildings, machinery, tools, and implements, but does not include the capi-

tal stock of any of the manufacturing corporations of the State. The value of the products was \$320,107,458, to produce which involved an outlay of \$8,766,682 for salaries of officials, clerks, etc., \$69,059,680 for wages, \$19,293,634 for miscellaneous expenses, including rent, taxes, etc., and \$197,363,495 for materials used.

The following table gives the leading statistics of the boot and shoe industry in the United States from 1890 to 1905:

	1905	1900	1890
Number of establishments.....	1,316	1,599	2,082
Capital.....	\$122,526,093	\$99,819,233	\$95,282,311
Wage-earners.....	149,924	141,830	133,690
Total wages.....	\$69,059,680	\$58,440,883	\$60,667,145
Miscellaneous expenses.....	19,293,634	10,669,402	9,217,519
Cost of material used.....	197,363,495	168,632,654	118,785,831
Value of products.....	320,107,458	258,969,580	220,649,358

The output of 13 leading manufacturing cities for 1890 and 1905 was as follows:

Cities	1905		1890	
	Rank	Value of product	Rank	Value of product
Brockton, Mass.....	1	\$30,073,014	2	\$16,171,624
Lynn, Mass.....	2	25,952,751	1	20,190,695
St. Louis, Mo.....	3	19,101,166	9	4,250,960
Haverhill, Mass.....	4	15,257,899	3	10,137,352
New York, N. Y.....	5	11,905,374	4	7,796,296
Cincinnati, Ohio.....	6	10,590,928	7	6,024,454
Rochester, N. Y.....	7	8,620,011	6	6,489,382
Marlboro, Mass.....	8	6,620,455	*	.....
Manchester, N. H.....	9	6,567,903	23	39,024
Chicago, Ill.....	10	5,592,684	10	7,251,034
Boston, Mass.....	11	5,575,927	17	1,508,697
Columbus, Ohio.....	12	5,425,087	20	359,000
Philadelphia, Pa.....	13	5,171,859	5	6,851,834

* Not reported separately.

According to the last census reports the industries allied to the manufacture of boots and shoes are also of importance. In 1905, there were 290 establishments employed on boot and shoe cut stock, 214 on boot and shoe findings, and 75 on boot and shoe uppers. The other statistics furnished by the census bureau were as follows: Boot and shoe cut stock: Capital, \$9,850,007; number of wage-earners, 5,936; wages paid, \$2,364,209; cost of materials, \$21,586,872; value of products, \$27,675,815. Boot and shoe findings: Capital, \$4,144,505; number of wage-earners, 4,206; wages paid, \$1,545,175; cost of materials, \$6,047,356; value of product, \$9,355,020. Boot and shoe uppers: Capital, \$281,006; number of wage-earners, 228; wages paid, \$102,702; cost of material, \$290,454; value of product, \$549,867. **FREDERICK D. HULL,**

Vice-President 'The Shoe Retailer,' New York and Boston.

Bora, Katharina von, wife of Luther: b. 29 Jan. 1499; d. 20 Dec. 1552. She took the veil very early in the nunnery of Nimptschen, near Grimma; but feeling very unhappy in her situation, applied, with eight other nuns, to Luther, whose fame had reached them. Luther gained over a citizen of Torgau, by the name of

BORACIC ACID—BORASSUS PALM

Leonard Koppe, who, in union with some other citizens, undertook to deliver the nine nuns from their convent. This was done the night after Good Friday, 4 April 1523. Luther brought them to Torgau, and from thence to Wittenberg. At the same time, to anticipate the charges of his enemies, he published a letter to Koppe, in which he frankly confessed that he was the author of this enterprise, and had persuaded Koppe to its execution; and he also exhorted the parents and relations of the virgins to admit them again into their houses. Some of them were received by citizens of Wittenberg; others who were not yet too old Luther advised to marry. Among the latter was Katharina, whom Philip Reichenbach, at that time mayor of the city, had taken into his house. Luther proposed to her several of his friends. She declined these proposals, but declared her willingness to bestow her hand on Nicholas von Amsdorf, or on Luther himself. Luther, who in 1524 had laid aside the cowl, was not averse to matrimony, yet appears to have been led to the resolution of marrying by reason rather than by passion. This step gave rise to many disadvantageous rumors, some of them as shameful as they were unfounded. After Luther's death Katharina removed from Wittenberg to Leipsic, where she was compelled to take boarders for her support. She afterward returned to Wittenberg and finally removed to Torgau, where she died. In the Church of Torgau her tombstone is still to be seen, on which is a life-size image of her.

Boracic (-ras'-) **Acid**, or **Bo'ric Acid** (from "borax"), a compound of boron with oxygen and hydrogen, having the formula H_2BO_3 , and possessing feebly acid properties. It occurs in an impure state in the crater of Vulcano, one of the Lipari islands. It is also found plentifully in Tuscany, where it issues from fissures in the soil, together with sulphurous exhalations, ammonia, and other substances. On account of its having been obtained at Sasso, the acid is called by mineralogists *Sassolite*. The principal supply of boracic acid is obtained from Tuscany, the exhalations above referred to being passed through water which absorbs the acid. The preparation of boracic acid from these aqueous solutions is an interesting process on account of the natural obstacles which have to be surmounted. The apparently simple operation of concentrating the solution, so as to obtain the acid by crystallization, in reality involves great practical difficulties, because in Tuscany the fuel supply is limited. This drawback has been overcome by utilizing the volcanic heat of the district to concentrate the solution. Around the cracks in the soil (called "fumaroles" or "soffioni"), from which the steam containing the acid issues, and enclosing the small lakes or lagoons in which it condenses, brick tanks are built on different levels, but communicating with each other. These are supplied with cold water, in which the steam is further condensed. When the water in the tanks is sufficiently saturated, it is run off into a deep vessel, where it is allowed to stand until the black mud mechanically suspended in it falls to the bottom, and then the clear fluid is run into a series of shallow evaporating pans of lead. These pans are heated by steam from the soffioni, the steam being made to pass under them by a system of flues. As the evaporation proceeds the fluid becomes richer in boracic acid, and when it attains a cer-

tain specific gravity, it is passed into a deep vat, where it is allowed to cool. Boracic acid then crystallizes out. The first crop of crystals is quite impure, but it is improved by re-crystallization, and the second crop as thus obtained is packed in casks and exported. Commercial boracic acid sometimes contains as much as 25 per cent of foreign matter, consisting largely of clay, salts of calcium and magnesium, and sulphates and other salts of the alkalis. About 2,000 tons of crude boracic acid are exported from Tuscany per annum. Boracic acid is also prepared artificially by decomposing a hot solution of borax with sulphuric acid. The boracic acid separates out upon cooling. Boracic acid is a white, glassy substance, slightly soluble in cold water, and considerably more soluble in hot water. It possesses strong antiseptic properties, and is used as a preservative for meat. It is also used for glazing porcelain, and in the manufacture of certain kinds of glass. Boracic acid forms salts called "borates" with various metallic bases, of which borax (q.v.) is the most important. See BORON.

In medicine, boracic acid is used very widely. It is a mild antiseptic, and its solutions are useful for cleansing the eyes, nose, mouth, bladder, etc. It forms with aromatic oils the basis of most mouth washes and nasal sprays. Boracic acid is also very useful in the nursery for keeping nipples free from bacteria, and it is of great service in washing out nursing-bottles, babies' mouths and eyes, and the mother's nipples while nursing. Large doses may prove poisonous.

Bo'racite (from "borax"), a mineral, tetrahedral and isometric in external form, but orthorhombic in molecular structure, and becoming isotropic only when heated to 510° F. It has the composition $6MgO.MgCl_2.8B_2O_3$, and a little iron is also occasionally present, probably as an impurity. It occurs in beds of anhydrite, gypsum, and salt, notably at Stassfurt, Prussia, also in crystals at Lüneberg, Hanover and Westeregeln, Saxony. The mineral has been prepared artificially by melting together 10 parts of boracic acid, 100 of sodium chloride, and 5 of magnesium borate. Boracite is strongly pyroelectric. Its molecular structure has been the subject of much study, on account of its exhibiting double refraction, although the mineral is apparently isometric in crystalline form.

Borage, the small genus, typical of the natural order *Boraginaceæ*, the species of which are most numerous in the Mediterranean region. Common borage (*Borago officinalis*), a coarse growing annual herb frequent in waste places, is about two feet tall with erect stem, rough, hairy leaves, and blue flowers arranged in racemes. Like many other innocuous plants, borage was highly valued medicinally, but is now not so employed. It is occasionally raised as a pot herb or salad plant, its young leaves being palatable. The flowers are still used to make the beverage known as cool tankard, a mixture of wine, lemon, sugar, and water. The plant's chief use, however, is as bee pasturage, its flowers being rich in nectar.

Boras, Sweden, a town in the province of Elfsborg, 36 miles east of Gothenburg. It was founded by Gustavus Adolphus in 1632. There are some cotton and linen manufactures, and also some dyeworks.

Borassus Palm. See PALMYRA PALM.

BORAX — BORDEAUX

Borax, a compound of the metal sodium with boracic acid (q.v.). The formula of boracic acid may be written $\text{HBO}_2 + \text{H}_2\text{O}$; and if the hydrogen of the HBO_2 is replaced by sodium, a compound known as sodium borate is formed, which crystallizes as $\text{NaBO}_2 + 4\text{H}_2\text{O}$. Fused borax is this salt deprived of its water of crystallization, and combined with boron trioxide in the form $2\text{NaBO}_2 + \text{B}_2\text{O}_3$, or $\text{Na}_2\text{B}_4\text{O}_7$. Common borax, when crystallizing from aqueous solution, however, contains 10 molecules of water. Other forms of borax are easily obtained, crystallizing with different quantities of water. Borax occurs native, both as a saline efflorescence on the soil, and as monoclinic crystals. Until recent times the principal borax supply of the world was obtained from the salt lakes of Tibet. It was brought to Europe in the crude state, under the name of Tincal. Enormous quantities of borax are now obtained from California and Nevada. Borax Lake, some 80 miles north of San Francisco, was discovered in 1856. It contains borax in solution, and crystals of the mineral also occur in the surrounding mud and marshes. The crystals are occasionally quite large, weighing as much as a pound each. It is also found in large quantities at Borax Lake in San Bernardino County, Cal., and it occurs abundantly as an efflorescence in Death Valley, Inyo County, Cal. Borax is extensively used in the household, and it is used also as an antiseptic and preservative. Like boracic acid, it is employed in glazing porcelain. Its property of dissolving metallic oxides makes it of great value in blowpipe analysis (q.v.) and as a flux in the soldering of metals. In the United States commercial borax is chiefly derived from the colemanite deposits of California.

Borax is of toxicological interest because it is widely used as an antiseptic, a preservative for meats and other foodstuffs, and also as an abortifacient. In large doses there is marked gastro-enteritis, in addition to which there are symptoms of collapse, coldness of the skin, bad pulse, psychical depression, and diminution in the quantity of urine eliminated. Similar symptoms may occur from the use of borax in washing out large abscess cavities. Singultus and general motor paralysis are the symptoms in fatal cases. Borax certainly has atoxic action on the kidneys when taken in large amounts. There is albumen in the urine, casts, pain in urination, and even bloody urine. While the kidneys are markedly affected by large doses it is questionable whether borax, in the small amounts used in food preservation, causes any grave symptoms of kidney irritation, even when taken for a considerable length of time. It may well be that certain individuals have an idiosyncrasy to boron salts, in which case their use would prove detrimental. See BORON.

Borchgrevink, Carsten Egeberg, Norwegian explorer and lecturer: b. Christiania, 1864, his mother being English and his father a Scandinavian. He went to sea at an early age, but returned to go to college. In 1898 he went to Australia, joined the survey department, and scaled Mount Lindsay. In 1894-5 he was in Antarctic waters, a region more fully explored by him in 1897, when he attempted to reach the South Pole without success. In 1899 (17 February) he had, however, reached Robertson Bay. Returning to London in 1900 he reported hav-

ing reached lat. 78.50 S.; lon. 195.50 E., the farthest point south ever reached by man. Consult his work, 'First on the Antarctic Continent.'

Borda, Jean Charles, French engineer, and afterward a captain in the French marine, famous for his mathematical talents: b. Dax, department of Landes, 4 May 1733; d. 20 Feb. 1799. In 1756 he was chosen a member of the Academy of Sciences, and occupied himself in making experiments on the resistance of fluids, the velocity of motion, and other topics relating to dynamical science. In 1767 he published a dissertation on hydraulic wheels, and afterward one on the construction of hydraulic machinery. In 1771, with Verdun de la Crenne and Pingré, he made a voyage to America, to determine the longitude and latitude of several coasts, isles, and shoals, and to try the utility of several astronomical instruments. In 1774 he visited the Azores, the Cape Verde Islands, and the coast of Africa for the same purpose. In the American war he was very useful to the Count d'Estaing by his knowledge of navigation. Borda was the founder of the schools of naval architecture in France. He invented an instrument, of a very small diameter, which measures angles with the greatest accuracy, and which has been used in measuring the meridian; the reflecting circle, which has made his name immortal; besides an instrument for measuring the inclination of the compass-needle, and many others. On the establishment of the National Institute, he became one of its members, and was occupied with other men of science in framing the new system of weights and measures adopted in France under the republican government. Among the latest of his labors was a series of experiments to discover the length of a pendulum which should vibrate seconds in the latitude of Paris. The principal of his writings are: 'His Voyage' and his 'Tables Trigonométriques Décimales.'

Bordeaux, France, capital of the department of Gironde, is situated on the left bank of the Garonne, about 70 miles from the sea, and 284 southwest of Paris. It is built in a crescent form round a bend of the river, which is lined with fine quays for more than three miles, and is crossed by a magnificent stone bridge of 17 arches, finished in 1821 at a cost of \$1,200,000. There is another bridge, a fine iron structure, for the railway from Paris. Bordeaux consists of an old and a new town, the boundary between them being formed by a wide and handsome street which, commencing at the quay near the centre of the crescent, stretches across the city from east to west. The objects chiefly deserving of notice in the old town are the arch called the Porte de Bourgogne at the extremity of the bridge, forming the principal entrance to the town; the cathedral, a fine Gothic edifice built at different periods; St. Michael's Church, with a lofty detached tower, and a superb front of florid Gothic; the Church of St. Croix, a specimen of gorgeous Romanesque; the bourse or exchange, the custom-house, the Hôtel de Ville, once the residence of the archbishops of Bordeaux, and the Palais de Justice. The new town is not so rich in public buildings. The most conspicuous are the library (200,000 volumes), the museum, and the theatre, a Grecian structure, regarded as the handsomest edifice

BORDEAUX MIXTURE — BORDEAUX WINES

in Bordeaux. Among the beneficent establishments the first place is due to the grand hospital or infirmary, which occupies the highest site in the town and is admirably arranged. Few cities are so well supplied with extensive and finely planted promenades. Bordeaux is the seat of a court of appeal, of courts of the first instance and of commerce; and has an academy of science, literature, and art; a preparatory school of medicine and pharmacy; a lyceum; a normal school for female teachers; a school of hydrography and navigation; a school of painting and design; a botanic garden, an observatory, various literary and scientific associations and a branch of the Bank of France. There are consuls resident here from all the states of Europe and America. The position of Bordeaux gives it admirable facilities for trade, and enables it to rank next after Marseilles and Havre in respect of the tonnage employed. Large vessels can sail up to the town, which by railway, river, and canal communicates with the Mediterranean, with Spain, and with the manufacturing centres of France. The chief exports are wine and brandy; drugs, dyes, and fruits are also largely exported. Sugar and other colonial produce and wood are the chief imports. Ship-building is the chief branch of industry, and there are also sugar-refineries, woolen and cotton mills, potteries, soap-works, distilleries, etc.

Bordeaux is the *Burdigala* of the Romans. In the 5th century it was in possession of the Goths, and it was pillaged and burned by the Normans. By the marriage of Eleonor, daughter of the last Duke of Aquitaine, to Louis VII., it fell into the hands of France. But in 1152 the princess was repudiated by her husband, and married to Henry of Anjou, who ascended the throne of England in 1154, as Henry II., and transferred Bordeaux to that crown. After the battle of Poitiers, Edward the Black Prince carried John, king of France, prisoner to Bordeaux, where he resided 11 years. Under Charles VII., in 1451, it was restored again to France. In 1548 the citizens rebelled on account of a tax on salt, and the governor, De Morems, was put to death, for which the constable of Montmorency inflicted a severe punishment on the city. During the revolution it was devastated as the rendezvous of the Girondists, by the Terrorists, almost as completely as Lyons and Marseilles. The oppressiveness of the continental system to the trade of Bordeaux made the inhabitants disaffected to the government of Napoleon, so that they were the first to declare for the house of Bourbon, 12 March 1814. The Roman poet, Ausonius, was a native of Bordeaux. Montaigne and Montesquieu were born in the neighboring country, and the latter lies buried there in the Church of Saint Bernard. Pop. about 275,000.

Bordeaux Mixture. See **FUNGICIDES**.

Bordeaux Wines. The finer red wines of the country around Bordeaux are the best which France produces. They contain but little alcohol; keep well, and even improve by removal. As the original fermentation is complete, they are, if judiciously managed, less subject to disorder and acidity than the Burgundy wines. None of the very best quality, however, is exported pure; a bottle of the best Château-Margaux, or Haut-Brion, is a rarity hardly to be procured in Bordeaux itself, at the rate of six

or seven francs a bottle. For export, the secondary growths of Médoc are mingled with the rough Palus. The red wines of Bordeaux are known in America under the name of claret. They have less aroma and spirit, but more astringency than the Burgundy wines. They are the safest wines for daily use, as they are among the most perfect of the light wines, and do not easily excite intoxication. In this respect they contrast with the Burgundy wines, which have more generous qualities than those of Bordeaux, although these wines have sometimes been accused of producing the gout, but this disparagement is without reason. Persons who habitually drink madeira, port, etc., and indulge in an excess of claret, may indeed be visited in that way; because a transition from the strong, brandied wines to the lighter is always followed by a derangement of the digestive organs.

The principal vineyards are those of Médoc, Graves, Palus, and Vignes Blanches; after these, those of Entre-deux-Mers, Saint Emilion, and the Bourgeais are the most important. The first growth of Médoc are the famous wines of Château-Margaux, Lafitte, and Latour. The Lafitte is characterized by its silky softness on the palate, and a perfume partaking of violet and raspberry. The Latour is fuller, has more aroma but less softness. The Château-Margaux is lighter than the Latour, and delicate like the Lafitte, but has not so high a flavor. Of the second growth, we may mention the Rauran and the Léoville. The average produce of the first growth is 217,000 gallons. The soil of Médoc is a sandy and calcareous loam. The gravelly lands (*les Graves*) to the south and west of Bordeaux produce the Graves. The first growth of the red Graves is the Haut-Brion, which rivals the first growth of Médoc; it has more color and body, but is inferior in aroma and taste. The principal white Graves are Saint Bris and Carbonieux. The best Médoc ought to be kept three or four years before removal; the Graves five or six. The wines of Palus, which is a bed of rich alluvial deposits, are inferior to the preceding; they are stronger and more deeply colored than those of Médoc. Being hard and rough, they are improved by a voyage, and are principally sent to the East Indies and America as *vins de cargaison*, or are mixed with Médoc which is intended for exportation. By the voyage they become more light and delicate, but are not to be compared with the growths of Médoc and the Graves. The best are Queyries and Mont Ferrand. The former are deeply colored, and have much body. Age gives them an agreeable aroma, resembling that of a raspberry.

Among the white Bordeaux wines, besides those already mentioned, the finest growths are Sauternes, Preignac, Barsac, and Bommes. Martillac and Saint Médard are of a good quality, and have lightness and body. Dariste, formerly Dulamon, is equal to Saint Bris and Carbonieux. Among other red wines are the Bourgeais, which are of a fine color, and acquire by age lightness and an agreeable almond aroma; of all the Bordelais wines they most resemble the Burgundy wines. The first growths are Debosquet, Château-Rousset, Tajac, and Falfax. The Bourgeais wines were formerly preferred to Médoc. The wines of Saint Emilion have been much esteemed. The Fronsac and Canon are the best. Those of Entre-deux-Mers become

agreeable with age. The *vins des Côtes* are good *vins ordinaires*; they are generally *fermes* and hard, and improve by age. The best are those of Bassens and Cenon. Consult Henderson's 'History of Ancient and Modern Wines.'

Borden, Simeon, American inventor and surveyor: b. Fall River, Mass., 29 Jan. 1798; d. 28 Oct. 1856. He instructed himself in mathematics and devised successful surveying instruments. The first American geodetic survey was his work. In 1846 he began the construction of railroads.

Bordentown, N. J., a city on the Delaware River, the Delaware and Raritan Canal, and the Pennsylvania R.R.; 57 miles southwest of New York. It is noted as being a former residence of Joseph Bonaparte (q.v.), brother of Napoleon I., and for many years the house and grounds belonging to the estate possessed much interest for the tourist. The city is the seat of the Bordentown Military Institute, the St. Joseph's Academy for girls (Roman Catholic), and the Bordentown Female College. There are steam forge and iron works, foundry and machine shops, worsted mills, shirt factory, canning factories, a shipyard and other industries. The city was incorporated in 1866. Pop. (1910) 4,500.

Border Ruffians, a name given, after the Kansas-Nebraska Bill of 1854, to the pro-slavery Missourians who acted as the allies of the slave element in Kansas, crossing the boundary to vote, by which means they organized the first government against the *bona-fide* free-labor residents by a vote of nearly double the inhabitants of the Territory. They kept the State in anarchy for three years, terrorizing the inhabitants by murder, arson, the sack of towns, and other outrages. The most graphic comment is the fact that they adopted this term of their enemies and prided themselves on it as an excellent joke. See KANSAS-NEBRASKA BILL.

Border States, before the War, the line of slave States lying next the free States: Delaware, Maryland, Virginia, Kentucky, and Missouri. The term was sometimes improperly made to include North Carolina and Tennessee, probably because their mountain districts held so large a proportion of loyalists; and Arkansas, for no special reason. Their political position was dictated by the facts that: (1) After the prohibition of the slave trade one of their chief industries was breeding slaves for exportation to the cotton, rice, and sugar plantations of the southernmost States. In the Virginia convention of 1832 it was said to be the most profitable in the State. (2) From their position they were the chief sufferers from the escape of fugitive slaves; in 1850 this was estimated at a loss of \$3,000,000 a year, and these States were the most insistent advocates of the Fugitive Slave Law and its enforcement; and in 1860 a Missouri senator urged the creation of a Federal police to patrol the border line for this purpose. (3) In case of war they would be the chief battlefield. They therefore furnished the backbone, if not the genesis of every political movement to stop the slavery agitation or conciliate the sections. The strength of the Know-Nothing party of 1856 and the Constitutional Union party of 1860 (Bell-Everett) was almost exclusively in the border States; the Peace Conference of 1861 and the proposed Crittenden Compromise were the work of these States. They tried to prevent the

outbreak of hostilities, and when the war began the governor of Kentucky went so far as to attempt making his State a neutral power outside both governments, and forbade either of them occupying it without the consent of the State authorities. Finally, however, they split up according to their natural affinities; the three not border States at all—North Carolina, Tennessee, and Arkansas—seceded, with Virginia; while in Kentucky, Maryland, Delaware, and Missouri, the loyal element, with government help, prevented the State from going out. They never gave up hope through the war, however, of reconciling differences by a convention of all the old States, North and South.

Border War, a name given during the struggle for Kansas to the intermittent civil war in that Territory, about 1854-8, between the free-soil and the slavery parties. It was begun by the attempt of the Missouri slaveholding party ('Border Ruffians,' q.v.) to reclaim by violence what the actual settlers had won by colonization; many of the worst atrocities were perpetrated, and all the temporary success of the slavery side won, by bodies of men who were not residents of Kansas at all. This caused up John Brown (q.v.) to move there from northern Ohio with his sons, and fight against them. Of the other partisan leaders on that side, the most notable was James Montgomery, who, however, was a *bona fide* settler. The most efficient leaders among the Missourians, or border ruffians, were James R. Atchison of Missouri and the Federal courts.

Bordighera, Italy, a town on the Mediterranean coast, in the district of San Remo and province of Porto Maurizio, a favorite winter residence for invalids, having been made fashionable by the visits of the members of the English royal family. Few places on the Riviera are better fitted for the accommodation of invalids and tourists. In addition to the usual facilities for the entertainment of strangers, the town has a library, museum, and a theatre. Pop. about 6,000.

Bordone, Paris, Italian painter of the Venetian school: b. Treviso, 1500; d. 1570. Under Titian he made rapid progress in painting. The execution of many works for his native city and for Venice spread his fame as far as France, whither he was invited by the king. The galleries of Dresden and Vienna possess several of his pieces. His most famous picture is the 'Old Gondolier Presenting a Ring to the Doge'; it is considered one of the masterpieces of the Venetian school. Other examples of his work are: 'Prophecy of the Tiburtine Sibyl,' in Florence; 'Combat of the Gladiators,' in Vienna, and 'The Chess Players,' in Berlin.

Bore, a word probably of Icelandic origin, and used to designate a very remarkable phenomenon which occurs in some rivers in spring-tides. At such times as the tide advances the water is suddenly thrown in as if in a mass, and then pursues its course up the river, and in opposition to the current, presenting a volume of water moving with great rapidity and resistless force, and with a height varying from two or three feet, as in the Severn, Trent, Solway, and Dee, to more than 12 feet in the Brahmaputra, and Tsien-Tangkiang. The last is said

BORE — BORGHESE

to have a rise of 20 feet, and advances with a loud roar, at the rate of 10 miles an hour. The tide in the Bay of Fundy rises with great rapidity, and is sometimes spoken of as the bore of Fundy. The circumstances in which the bore occurs afford an easy explanation of its cause, and show that it is produced by the disproportion between the volume of the tidal wave and the receiving power of the rivers into which it is thrown.

Bore, the cavity of a steam engine cylinder, pump barrel, pipe, cannon, barrel of a firearm, etc. In mechanics it is expressed in inches of diameter; in cannon formerly in the weight in pounds of solid round shot adapted thereto, but since the introduction of modern rifled ordnance of the breech loading pattern, the bore of cannon is always expressed in inches of diameter or in the equivalent of inches.

Boreas, the north wind, worshipped by the Greeks as a deity; residing in Thrace, and represented with wings, which, as well as his hair and beard, were full of flakes of snow; instead of feet he had the tails of serpents, and with the train of his garment he stirred up clouds of dust. Boreas was the son of Astræus and of Eos. When Apollo and his favorite Hyacinthus were once playing at quoits, he blew the quoit of the former, of whom he was jealous, upon the head of the youth, who was killed by the blow. By Oreithyia, daughter of Erechtheus of Athens, he was father of Cleopatra, Chione, Calais, and Zetes. The last two took part in the Argonautic expedition.

Borecole, a pot-herb. See KALE.

Boregat. See ROCK TROUT.

Borelli, Giovanni Alfonso, Italian physician and scientist: b. Naples, 1608; d. Rome, 31 Dec. 1679. After studying medicine he both practised and professed it at various places, but particularly at Pisa and Florence, and distinguished himself as the leader of those who have been called mathematical physicians, from regarding the human body as a kind of hydraulic machine, and then attempting to explain all its motions and functions in accordance with the principles of mathematics. He appears to have possessed very original and inventive powers, and made various discoveries, among which may be mentioned that of an apparatus apparently of the nature of a diving-bell, by which persons could descend into the water, remain in it and move about or rise and sink at pleasure, and of a boat by which two or more persons might row themselves beneath the water in any direction. His works discuss many important subjects in medicine, mathematics, and philosophy; but the great work on which his fame rests, though not published till after his death, is entitled 'De Motu Animalium,' and in so far as it relates to mere animal mechanics is full of interest and instruction; but when he attempts to apply his mathematical principles he falls into egregious blunders, and stumbles at every step.

Borelli's Comet. See COMET.

Borer, Round-headed and Flat-headed, insect enemies of several trees. See APPLE.

Borghese, the name of a patrician family of Sienna, Italy, which has been more or less distinguished since the middle of the 15th cen-

tury. A jurisconsult, of the name of Marco Antonio Borghese, who was employed by the papal court in the early part of the 16th century, appears to have laid the foundation of its fortunes at Rome. His third son, Camillo, became Pope Paul V. (q.v.), in 1605, and he lavished the honors and riches which his place enabled him to command on his relatives. For a son of his elder brother, named Marco Antonio Borghese, he procured the principedom of Sulmona and a grandeeship in Spain. His brother, Francesco, he made the leader of the troops sent against Venice in 1607, to maintain the papal cause against the opposition of that republic. Scipione Caffarelli, a nephew, he created cardinal. Paolo, the son of Marco Antonio, married Olympia Aldobrandini, the only child of the prince of Rossano, and grandniece of Clement VIII., and thus introduced the wealth of the Aldobrandini into the Borghese family. The son of Paolo, named Giovanni Battista, was the ambassador of Philip V. to the court of Rome, where he died in 1717. His son, Marco Antonio, was viceroy of Naples in 1721, and another of the same name, descended from him, became a noted collector of works of art, with which he adorned his sumptuous villa on the Pincian hill. See BORGHESE, CAMILLO PHILIP.

Borghese, Camillo Philip Louis, formerly Duke of Guastalla, Prince of France, etc.: b. 1775; d. Florence, 10 April 1832. When the French invaded Italy he entered their service, and showed great attachment to the cause of France, in particular to Gen. Bonaparte, whose sister, Marie Pauline (q.v.), he married. In 1804 he became a French prince, and grand cross of the Legion of Honor, and at the breaking out of the war against Austria in 1805, commander of a squadron of the imperial guard. After its termination his wife received the duchy of Guastalla, and he was created Duke of Guastalla. After having served in 1806 in the campaign against the Prussians and Russians, and after having been sent to Warsaw to prepare the Poles for a revolt, the emperor appointed him governor-general of the provinces beyond the Alps. He fixed his court at Turin, and became very popular among the Piedmontese. After the abdication of Napoleon he broke up all connection with the Bonaparte family, and separated from his wife. The prince sold to the French government for the sum of 8,000,000 francs 322 works of art which ornamented the palace of his ancestors, known under the name of the Villa Borghese. Among them were several masterpieces: for example, the 'Borghese Gladiator,' the 'Hermaphrodite,' the 'Silenus,' the 'Dying Seneca,' 'Amor and Psyche.' Bonaparte provided for the payment out of the national domains in Piedmont, which the king of Sardinia confiscated in 1815; at the same time, in consequence of the second invasion of France, the prince received back part of these treasures of art. In 1818 he sold Lucedio, in Savoy, for 3,000,000 livres. In the kingdom of Naples he possessed the principalities Sulmone and Rosano. He was one of the richest Italian princes.

Borghese, Marie Pauline (PRINCESS), sister of Napoleon: b. Ajaccio, 20 Oct. 1780; d. 9 June 1825. When the English occupied Corsica in 1793 she went to Marseilles, where she was on the point of marrying Fréron, a member of the Convention, and son of that critic whom

BORGHESI—BORGIA

Voltaire made famous, when another lady laid claim to his hand. The beautiful Pauline was then intended for Gen. Duphot, who was afterward murdered at Rome in December 1797; but she bestowed her hand from choice on Gen. Leclerc, then at Milan, who had been in 1795 chief of the general staff of a division at Marseilles, and had there fallen in love with her. When Leclerc was sent to St. Domingo with the rank of captain-general, Napoleon ordered her to accompany her husband with her son. She embarked in December 1801, at Brest, and was called by the poets of the fleet, the Galatea of the Greeks, the Venus Marina. Her statue, in marble, as Venus, was made by Canova at Rome—a successful image of the goddess of beauty. She was no less courageous than beautiful, for when the negroes under Christophe stormed Cape François, where she resided, and Leclerc, who could no longer resist the assailants, ordered his lady and child to be carried on shipboard, she yielded only to force. After the death of her husband she married at Morfontaine, in 1803, the Prince Camillo Borghese (q.v.). Her son died at Rome soon after. With Napoleon, who loved her tenderly, she had many disputes and as many reconciliations, for she would not always follow the caprices of his policy. Yet even the proud style in which she demanded what her brothers begged made her the more attractive to her brother. Once, however, when she forgot herself toward the empress, whom she never liked, she was obliged to leave the court. She was yet in disgrace at Nice when Napoleon resigned his crown in 1814, upon which occasion she immediately acted as a tender sister. Instead of remaining at her palace in Rome, she set out for Elba to join her brother, and acted the part of mediatrix between him and the other members of his family. When Napoleon landed in France she went to Naples to see her sister Caroline, and afterward returned to Rome. Before the battle of Waterloo she placed all her diamonds, which were of great value, at the disposal of her brother. They were in his carriage, which was taken in that battle, and was shown publicly at London. He intended to have returned them to her. She lived afterward separated from her husband at Rome, where she occupied part of the palace Borghese, and where she possessed, from 1816, the Villa Sciarra. Her house, in which taste and love of the fine arts prevailed, was the centre of the most splendid society at Rome. She often saw her mother, her brothers Lucien and Louis, and her uncle Fesch. When she heard of the sickness of her brother Napoleon, she repeatedly requested permission to go to him at St. Helena. She finally obtained her request, but the news of his death arrived immediately after. At her death she left many legacies, and a donation, the interest of which was to enable two young men of Ajaccio to study medicine and surgery. The rest of her property she left to her brothers, the Count of St. Leu and the Prince of Montfort. Her whole property amounted to about \$500,000.

Borghesi, Bartolommeo (COUNT), Italian numismatist: b. Savignano, 11 July 1781; d. 16 April 1866. His attention was devoted to elucidating, through the study of inscriptions, several obscure points in Roman history; and the books he published secured for him a great

reputation among the learned. He completed, after more than 30 years' labor, a full chronological list of the Roman consuls, embracing all the modern discoveries on the subject, with disquisitions on the most important questions connected with Roman antiquities. After his death a complete collection of his writings was ordered by the Emperor Napoleon, but it was not until 1897 that the work was finished.

Borgi, Giovanni, jō-vān'nē bôr-jē, the originator of ragged schools: b. Rome, about 1736; d. about 1802. He was a mason by trade, and after his daily toil was completed, he was in the habit of attending the sick in the hospital of Santo Spirito, spending entire nights in his labor of love, and frequently falling asleep at his work during the day. In his daily walks he had noticed troops of vagrant children in the streets, fast ripening into vice and crime. He took them home to his humble lodgings, and, having clad them with the aid of alms which he collected, he apprenticed them to useful trades. This noble work was observed and admired by others, who freely lent their aid, and in due time a society was formed, which was further developed in 1784. Although Giovanni was himself entirely uneducated, he perceived the advantages of instruction, and caused the children to be taught reading, writing, and arithmetic by one Francesco Cervetti, who afterward left him and founded another refuge for orphans called the "Assumption of the Virgin," which was consolidated with that of Giovanni in 1812. Pius VI. purchased for the institution the Palazzo Ruggi, and became the society's principal protector. Subsequently the charity was removed to different convents, and finally to the church of St. Anne of the Carpenters.

Borgia, Cesare, chā-zā'rē bôr-jā, Italian ecclesiastic and soldier: b. 1476; d. 12 March 1507. He was the natural son of Rodrigo Borgia, and a Roman lady named Vanozza. His father, who in 1492 became Pope, with the title of Alexander VI., made him a cardinal. When Charles VIII. of France made his entry into Rome, Alexander was obliged to treat with him, and delivered Cesare Borgia into his hands as a hostage, though he escaped a few days after from the camp of the king. In 1497 Alexander bestowed the duchy of Benevento, together with the counties of Terracina and Pontecorvo, on his eldest son, Giovanni, who had already received from the king of Spain the duchy of Gandia. Giovanni died shortly after his investiture, and Cesare has been accused of murdering his brother out of jealousy; but historical proof of this charge is utterly lacking. His father permitted him to abandon his ecclesiastical office and devote himself to the profession of arms, and sent him to France to carry to Louis XII. the bull for divorce and dispensation for marriage which he had long desired to obtain. Louis rewarded Borgia with the duchy of Valentinois, a body-guard of 100 men, and 20,000 livres a year, and promised to aid him in his projects of conquest. In 1499 Cesare married a daughter of King John of Navarre, and accompanied Louis XII. to Italy. He first undertook the conquest of Romagna, expelled the lawful possessors of the land, caused them to be treacherously murdered, and himself, in 1501, to be appointed by his father Duke of Romagna. In the same year he wrested the

BORGIA — BORGOGNONE

principality of Piombino from Jacopo d'Apiano. He also endeavored, though in vain, to make himself Duke of Bologna and Florence. In 1502 he announced that he was about to attack Camerino, and demanded for that purpose soldiers and artillery from Guidobaldo of Montefeltro, Duke of Urbino. Camerino was taken by storm, and Giulio di Barona, the lord of the city, with both his sons, was strangled at the command of Borgia. Meanwhile all the petty princes had united and collected soldiery for their defense; but Cesare Borgia terrified some by means of 3,000 Swiss whom he called to Italy, and gained over others by advantageous offers. Thus he dissolved their alliance, seized their lands, and saw no further obstacle to his being made, by his father, king of Romagna, of the March, and of Umbria, when Alexander VI. died, 17 Aug. 1503. At the same time Cesare Borgia was attacked by a severe disease at a moment when his whole activity and presence of mind were needed. He found means, indeed, to get the treasures of his father into his possession, assembled his troops in Rome, and formed a closer alliance with France; but enemies rose against him on all sides, one of the most bitter of whom was the new Pope, Julius II. Borgia was arrested and carried to Spain, where he remained for two years in prison. He at length made his escape to his brother-in-law, the king of Navarre, went with him to war against Castile, and was killed by a shot before the castle of Viana.

Borgia, Francisco, frân-thēs'kō, or **St. Francis** (DUKE of GANDIA), Spanish ecclesiastic: b. Janda, Spain, 1510; d. Rome, October 1572. He was eminent as a soldier and statesman, and enjoyed the confidence and friendship of Charles V., who appointed him viceroy of Catalonia. While very young he married a noble Portuguese lady, Eleonora de Castro, by whom he had a large family. He was always very strict in his morality, and exact in his religious duties. After the death of his wife he entered the Society of Jesus, and was ordained priest in the 40th year of his age. At the death of Laynez, in 1565, he was elected General of the society, and remained in office until his death. Several bishoprics, and the dignity of cardinal, were repeatedly pressed upon him, but he refused them all. He was canonized by Clement X. in 1671.

Borgia, Lucrezia, loo-krād'zē-ā, daughter of Pope Alexander VI., and sister of Cesare Borgia (q.v.): b. 1480; d. Ferrara, 24 June 1519. When a mere child she was betrothed to a gentleman of Aragon, but her father, on attaining the popedom, thought the match beneath her, and broke the engagement, marrying her to Giovanni Sforza, lord of Pesaro. After she had lived with him for four years, Alexander dissolved the marriage on the ground of the husband's impotency, and gave her to Alphonso, Duke of Bisceglia, natural son of Alphonso II. of Aragon. Two years after her husband was assassinated in a quarrel with Cesare Borgia. Within the course of a year she married Alphonso d'Este, son of Ercole, Duke of Ferrara. Here she became a liberal patroness of poets, who endeavored to repay her benefactions by lauding her as the pattern of every virtue. The character of Lucrezia Borgia has been the subject of much controversy, but recent historical

researches have placed her in a much fairer light and it has been shown beyond dispute, that after her marriage to Alphonso d'Este her life was a model of virtue and beneficence.

Borgia, Rodrigo. See ALEXANDER VI.

Borgia, Stefano, stē-fā'nō, Italian ecclesiastic: b. Velletri, 3 Dec. 1731; d. Lyon, 23 Nov. 1804. He was brought up by his uncle, Alexander Borgia, Archbishop of Fermo, and in 1750, on becoming a member of the Etruscan Academy of Cortona, commenced at Velletri to form a museum which has since become one of the richest private collections in existence. In 1759 he was appointed by Benedict XIV. governor of Benevento, and in 1770 he became secretary to the College of Propaganda, which brought him into immediate relation with missionaries to all parts of the world, and enabled him, at comparatively little expense, to enrich his museum with manuscripts, coins, statues, idols, and all the other rarities which each country possessed. In 1789 Pius VI. made him a cardinal, and at the same time appointed him inspector-general of the foundling hospital, into which he introduced extensive reforms. In 1797 the revolutionary spirit which had broken out in France extended itself to Rome, and the Pope, as the best means of counteracting it, gave all his confidence to Borgia and installed him as dictator. The situation was extremely difficult, but he showed himself worthy of the trust, and gained such ascendancy over the public mind that tranquillity and good order remained uninterrupted till 1798. By this time the French were at the gates, and the popular party, becoming dominant, established a republic. The Pope was compelled to depart, and Cardinal Borgia, at first arrested, was ordered, on obtaining his liberty, to quit the papal states. After disembarking at Leghorn he repaired to Venice and Padua, and continued regularly to discharge his functions in connection with the Propaganda as if nothing had occurred to interrupt them. He returned to Rome with the new Pope, Pius VII., who treated him with the same confidence as his predecessor. Afterward, when Pius VII. was carried off to France, Borgia was ordered to accompany him, and he accordingly set out, but had only reached Lyons when he was seized with a serious illness, and died. He was the author of several antiquarian and historical works, and deserves honorable mention for his liberal patronage of arts and artists.

Borgne, bōr-nē, Lake, Louisiana, a body of water situated in the southeastern part of the State. Though termed a lake, it is strictly the termination of that large arm of the Mexican Gulf known as Pascagoula Sound, being united to that by a pass or strait crossed by a line of small islands and faced on the east by Grand Island. Lake Borgne is also connected with Lake Pontchartrain by the Rigolet Pass. It is about the average depth of Lake Pontchartrain, and approaches within 15 miles of New Orleans. Its greatest extent is in a northeast and southwest direction, in which its length is about 30 miles. Lake Borgne forms a part of the western boundary of the Mississippi Delta.

Borgognone, Jacopo Cortesi, yā-kō-pō kōr-tā-zē bōr-gō-nyō-nē, French painter: b. St. Hippolite, Burgundy, 1621; d. 1766. He

BORGU — BORING

studied painting under his father, but enlisted in the army and remained in it for three years. On his return he resumed his art, and went to Bologna where he attracted the notice of Guido and became an inmate in his house, where he made good use of the valuable opportunities of improvement thus afforded him. After realizing an independence he visited his native place. Returning again to Italy, where he painted with much success, he resolved to become a Jesuit. He was accordingly admitted into the order at Rome in 1655, but he appears to have painted as diligently as ever. He is remarkable for freedom of design, and the vividness with which his pictures bring the subjects which they represent before the mind.

Borgu, bôr-goo', Africa, a district in the Western Sudan, lying about lat. 10° N., and stretching from the meridian of Greenwich east to the Niger. It is hilly in parts, but much of it is well watered and extremely fertile. Among its numerous productions are rice, grain, indigo, cotton, bananas, and citrons. The inhabitants are Mohammedan. Kiama and Wawa are chief towns.

Bo'ric Acid. See BORACIC ACID.

Boring, a species of circular cutting in which a cylindrical portion of a substance is gradually removed. When tubes of metal are to be formed, a cast is, in some cases, made in solid metal, and the whole of the bore is produced by the boring-machine: in others the cast is made hollow at first, and the borer is only used to give uniformity and finish to the inside of the tube. In boring cannon sometimes the tool is made to revolve while the cannon is at rest, and sometimes the cannon is made to revolve while the tool is at rest. By the latter arrangement the bore is said to be formed with more accuracy than by the other method of putting the borer in motion.

In the jewelry and small metal industries, hand drills, which consist of a spindle with steel bits, to which reciprocating rotation is given, are the implements for piercing small holes. The boring of holes in metal plates is effected by means of drills driven by machinery. The drill is inserted in the end of a vertical spindle, which revolves in a fixed frame and is driven by the bevel wheels. The metal to be bored is placed on a table or other support, below the drill; and the up and down motion, or end pressure and off action, of the drill is effected by the hand gear turning the screw; which, being coupled to the top of the spindle, presses it down or raises it, according to the way it is turned. The spindle slides vertically in the collar forming the axis of the bevel wheel, but is carried round with it by means of a pin which projects into a groove.

As applied to the earth and to rocks, boring embraces two classes of operations — boring of shot-holes for blasting, and the sinking of bores in prospecting for minerals and in forming wells for water, brine, and mineral oils. Blast-holes in rocks are made from one to two — sometimes more — inches in diameter, and may pierce to the depth of nine feet. Such holes are most simply made in hard rock by a steel-pointed drill, struck by a hammer, and turned partly round after each blow to make the hole cylindrical. The addition of a little water serves to preserve the temper of the boring tool, and

makes the rock more easy to cut. In soft rock, whenever the hole is to be vertical, a *jumper* is used. This is a weighted drill, which acts merely by its own weight when let fall from about a foot in height. The powdered stone is removed at intervals by a scraper. But in all great engineering undertakings rock-boring machinery now supplants hand work. The machines are principally devised to imitate the percussive action of the hand drill, the boring chisel being worked and rotated by compressed air, and sometimes directly by steam. The compressed-air machines possess the great advantage of aiding in the ventilation of the working — often a most important consideration, seeing the operations are chiefly carried on in confined spaces where large volumes of poisonous gases are evolved from explosions. The earliest practical rock-boring machine was that of Sommeiller, one of the engineers of the Mont Cenis tunnel, at which undertaking the apparatus was first used. Now the forms of percussion machines are very numerous, improvements being directed toward lightness and simplicity of parts, and to the method — automatic or otherwise — of advancing the boring-tool as the work proceeds. Among the best known machines are the Barrow, Burleigh, Darlington, Ferroux, Ingersoll, and McKean rock-borers. Diamond drills working in the manner described below are also used. Brandt's rotatory borer is an apparatus similar in action to the diamond drill, but with a crown of hardened steel in place of cutting diamonds. The tool is pressed against, and rotated by water power. An apparatus similar in principle to the brace and bits of the carpenter is used with advantage in uniform rock, such as slate.

The bores for deep wells of all kinds, and for discovering the mineral contents of a region, come under one category. As a preliminary operation in mining, boring is of the utmost importance for discovering the position, thickness, and dip of mineral strata or lodes, and for ascertaining the nature of the overlying deposits. Bores are made by three classes of implement — (1) boring-rods, (2) rope borers, and (3) diamond drills.

The rod-boring instrument consists of an iron shank having a cross-bar at the top and a hollow screw at the bottom; to this all the successive boring instruments are fastened. A simple chisel is first attached to the screw, and one or two men press upon the cross-bar, and, at the same time, force it round like an auger; while another workman, by means of a lever erected overhead, with a chain descending from it to the cross-bar, gives an up-and-down motion to the instrument. When the chisel becomes clogged, from the accumulation of material which it has loosened, it is exchanged for a cylindrical auger, provided with a valve, which scoops out the separate material; and thus by alternate chopping and scooping the work is carried on. The nature of the strata is determined with considerable facility and certainty by examining the fragments brought up by the auger. As the work advances, successive lengths of rod are screwed on at the upper end. A derrick pole is erected over the bore hole for the purpose of elevating the rods, to permit the change of the tools.

The rope method of boring has been long in use among the Chinese. By it the great loss of time arising from the screwing and unscrewing

BORISSOGLEBSK — BORN

of the rods at each elevation of the chisel or auger is saved. The chisel and scooping instrument are fastened to a rope, which is alternately elevated and allowed to descend by the simple force of gravity; the instrument thus forces its way through the ground. In the softer rocks of the newer formations this method has been successfully employed in boring for artesian wells. The rope-boring machinery of Mather and Platt, of Salford, England, in which a flat hempen rope is employed, is in extensive use.

For deep well-sinking, as in the Pennsylvania oil region, where depths of 2,000 feet and more have to be reached, and for mineral prospecting, the diamond drill has of late years largely superseded all other borers. With this apparatus the earth can be pierced at any angle, which is a great advantage in investigating mineral deposits; and, moreover, the drill produces solid and continuous cores of the strata through which it passes, so that a complete section of any bore can be exposed to view. The diamond drill consists of a crown, or cylinder of steel, around one edge of which are fixed a series of black diamonds. These diamonds are so set that they project alternately a little beyond the outside and inside edge of the cylinder. This crown is screwed to lengths of iron tubing as it cuts its way by rotation into the rock, and it makes, as it descends, an annular cutting somewhat larger than the thickness of the continuous tube, which the crown and its shaft form. Thus a core of rock is cut out and held within the tube, and the pieces may be lifted out from time to time as the work proceeds. The detritus resulting from the abrasion of the ring of rock is continuously washed away by a current of water, forced down within the tubing. Diamond drills are made of many sizes, from 1¼ up to 18 inches in diameter. The prototype of the diamond drill was M. Fauvelle's hollow boring-rod with steel crown, described at the British Association meeting in 1846.

Borissoglebak, bō-rē'sō-glēpsk, Russia, a town in the government of Tambov, 120 miles south of the town of that name, and capital of the government. From its situation and water communications it is the centre of a very large trade. It is the seat of an annual fair, and has woolen and iron manufactures. Pop. about 25,000.

Borissov, bō-rē'sof, Russia, a town in the government of Minsk, 50 miles northeast of the town of that name, on the left bank of the Berezina. Not far from it took place the disastrous passage of the Berezina by the French in 1812. Pop. about 15,000.

Börjeson, Johan Helenus Laurentius, yō-hān ēl-ā'nūs lō-rēn'shē-ūs bē'r'yē-sōn, Swedish sculptor: b. Halland, 1835. He studied at Rome and Paris, and in 1879 became professor at the Art Academy of Stockholm. His work includes both portrait-statues and ideal subjects, in which he unites fidelity to nature with love of beauty. Among his works are 'The Bowler'; 'The Fisher Boy of Capri'; 'Youth with a Tortoise'; and the statues of the poet Holberg at Bergen, of the historian Geiger at Upsala, of Axel Oxenstiern at Stockholm, and of King Charles X. Gustavus at Malmö.

Borland, Solon, American senator: b. Virginia; d. Texas, 31 Jan. 1864. He was educated in North Carolina, studied medicine and settled

in Little Rock, Ark. During the Mexican war he served as major in Yell's cavalry, and was taken prisoner in January 1847. After his discharge in June 1847 he served as a volunteer aid to Gen. Worth until the end of the campaign. After serving in the United States Senate (1848-53), he was appointed minister to Central America. When returning to the United States after his resignation he was assaulted at San Juan de Nicaragua for interfering to prevent the arrest of a person charged with murder at Puntas Arenas. For this insult the sloop-of-war Cyane bombarded and destroyed the town, under instructions from the United States government; 13 July 1854. During the Civil War he was a brigadier in the Confederate service, and before his State seceded, raised troops and seized Fort Smith, by order of Gov. Rector, 24 April 1861.

Borlase, William, English mineralogist and antiquarian: b. Pendennis, Cornwall, 1696; d. 1772. He studied at Oxford, entered orders, and became successively rector of Ludgvan and vicar of St. Just. The richness of Cornwall in mineral products and antiquities gave a direction to his studies, and he began making collections with the view of afterward giving a description of his native county. In 1750 he was elected a Fellow of the Royal Society, to which he had communicated a valuable paper on the spars and crystals of the Cornish mines, and for many years after he continued to write in its 'Transactions.' In 1754 he published his 'Antiquities of Cornwall,' and in 1758 he completed the work by publishing his 'Natural History of Cornwall.' He kept up a correspondence with the most eminent men of his day, and was on intimate terms with Pope, whom he furnished with materials for his groto at Twickenham. Dr. Borlase's name, formed out of crystals, is still to be seen there.

Bormann, bōr'mān, Edwin, German poet: b. Leipsic, 14 April 1851. He was educated at the Polytechnic Institute of Dresden, and at Leipsic and Bonn. His first success was won by a series of humorous poems in the Saxon dialect which appeared in the 'Fliegende Blätter.' His other works are in High German; they include 'Seid umschlungen, Millionen,' a book of humorous songs, 'Schelmenlieder'; 'Das Büchlein von der Schwarzen Kunst,' 'Liederhort in Sang und Klang,' and 'Klinginsland, Minnelieder und Spielmannsweisen.'

Bormio, bōr'mē-o (Ger. WORMS, VOORMZ), Italy, a town in Lombardy, near the Adda; pop. about 2,000. In its vicinity are the salt baths called Bagni di Bormio. The temperature is 99° 5'. Gen. Dessolles achieved here a victory over the Austrians, 26 March 1799. The beautiful galleries of the road which leads over the Wormser Joeh (an Alpine mountain), from Tyrol to Italy, were destroyed by the Italians in 1848.

Born, Bertrand de, bār-trōñ dē bōrn, French troubadour and warrior: b. in the Castle of Born, Périgord, 1140; d. about 1209. He dispossessed his brother of his estate, whose part was taken by Richard Cœur de Lion in revenge for De Born's satirical lays. Dante places him in the 'Inferno' on account of his verses intensifying the quarrel between Henry II. and his sons.

Börne, Ludwig, lood'vīg ber'ne, German political writer: b. Frankfort-on-the-Main, of Jewish parents, 6 May 1786; d. Paris, 12 Feb. 1837. He founded, and for three years conducted, *Die Wage*, a journal devoted to civics, science, and art. Of his numerous satirical sketches, all full of humor and wit, these are perhaps the most brilliant: 'Monograph on the German Postal Snail,' 'The Art of Becoming an Original Author in Three Days,' 'Memorial Address to Jean Paul.' Fierce animosity toward the dynastic policies of Germany permeated whatever he wrote; even his literary and dramatic criticism was biased by this passion. His last completed work, 'Menzel, the French Devourer' ('Franzosenfresser'), is proof that to the last his voice was still for war. His 'Complete Works,' in 12 volumes, were published in 1863.

Bor'neëne. See BORNEOL.

Bornell, Giraud de, zhē-rō dē bōr-nā-ē, a Provençal troubadour of the 12th century: a native of Exideuil, Dordogne. His contemporaries bestowed on him the sobriquet 'Master of Troubadours.' Some 80 of his songs are extant; among them the charming song of the morning, 'Alba.'

Bornemann, Wilhelm, vī'hēlm bōr'ne-mān, German dialect poet: b. Gardelegen, 1766; d. 1851. He is one of the foremost representatives of modern Low German poetry. His works are 'Low German Poems' (1810), republished in a 10th edition in 1891; 'Pictures of Nature and the Chase' (1829); 'Humorous Hunting Songs.'

Bor'neo (corrupted by the Portuguese from Bruni or Brunei, the name of a state on its northwest coast), one of the islands of the Malay archipelago, and, next to Australia and New Guinea (but not much smaller than the latter), the largest island in the world. On the south it has the Java Sea; on the east the Strait of Macassar and the Sea of Celebes; on the north the Sulu Sea; on the west and northwest the China Sea. Its circumference is about 3,000 miles, its greatest length, 780 miles, and its greatest breadth 690 miles; area, according to recent calculation, 283,358 square miles. Its outline is but slightly indented by bays and inlets; and yet the skeleton of its mountain ranges, now well ascertained by the travels of Dalton, Low, Burns, and Schwaner, show that at not a very remote period it must have presented the same singular configuration with Celebes and Gilolo—that of a group of peninsulas. Starting from the central mountains, the Anga-anga group, and proceeding northeast, we trace a chain, terminating in Kinibaloo (11,000 feet high, the highest peak in Borneo), which forms the backbone of the peninsula. Hardly half of the island is good terra firma, habitable for man. An alluvial marshy band, varying from 30 to 50 miles in width, surrounds the island, the only avenues to the interior being its numerous rivers and streams. The mouths of 23 rivers, all navigable on an average 100 miles for vessels drawing not more than 12 feet of water, can be counted along the northwest coast, between Capes Sampanmanjo and Datoo. Berow and Coti rivers on the east, Banjar, Murong, Kahajan, and Mendawei rivers on the south, and the rivers Pontianak and Sambas on the west are large streams with tides flowing

far up, and some of them navigable for 200 miles. Innumerable smaller streams flow from the great water-sheds.

In connection with the river systems there are numerous lakes in Borneo; but of true mountain lakes on a large scale there are probably few. The great lake of Kinabalu, which figured in older accounts, with 100 miles of circumference, is a pure myth, based perhaps on a misunderstood description of the great grass-covered plain of Danao.

Meteorological Conditions, Products, etc.—

The climate in the low grounds is humid, hot, and unhealthful for Europeans; but in the higher parts toward the north the temperature is generally moderate, the thermometer at noon varying from 81° to 91° F. During the rainy season, from November to May, heavy storms of wind with loud thunder are experienced on the west coast. The influence of the land and sea breezes passes inland to quite remarkable distances across the level plains and up the river valleys. Vegetation is extremely luxuriant. The forests produce ironwood, bilian, teak, ebony, sandalwood, gutta-percha, dyewoods, benzoin, wax, dragon's-blood, sago, various resins, vegetable oils, and gums. The camphor of Brunei is the best in Asia. The mohor-tree, well adapted for making native boats, attains a height of 80 feet, and the kaladang, suited for large masts, of 200 feet. Nutmegs, cloves, cinnamon, pepper, betel, ginger, rice, millet, sweet potatoes, yams, cotton in Amuntai, sugar-cane in Sambas and Montrado, indigo, tobacco, coffee in Sambas, pineapples, cocoanuts, etc., are cultivated. The mountains and forests contain many monkeys, among which is the orang-outang. Tapirs, a small kind of tiger, small Malay bears, swine, wild oxen or banteng, and various kinds of deer abound. The elephant is found only in the north and the rhinoceros in the northwest. The few domesticated animals are buffaloes, sheep, goats, dogs, and cats. A few horses are seen in Banjermassin. Among the birds are eagles, vultures, argus pheasants, peacocks, flamingoes, pigeons, parrots, and also the swifts (*Collocalia esculenta*) which construct the edible nests prized by the Chinese for making soup. The rivers, lakes, and lagoons swarm with crocodiles, and many kinds of snakes, frogs, lizards, and leeches. Fish is plentiful, and the coasts are rich in tortoises, pearl mussels, oysters, and trepang. Brilliant butterflies and moths are in great variety. Among the mineral products are coal, gold, and copper, especially in Montrado; antimony, iron, tin, platina, nickel, diamonds and other precious stones, rock crystals, porcelain clay, petroleum, and sulphur. The diamond mines are chiefly in Landak and Pontianak; Sambas produces the greatest quantity of gold; the kingdom of Brunei, Kutei, and Banjermassin, the largest amount of coal. The Pengaron coal field, worked by the Dutch government, is one of the most important.

Population.—The population consists of three classes, the Dyaks or Dayaks, who are the aboriginal heathen inhabitants and constitute the great bulk of the population; the Mohammedans or Malays—for this name is extended so as to include all professors of Islam, whether true Malays, Buginese, Javanese, Dyaks, or Arabs; and the Chinese. The Dyaks live chiefly in the interior, and employ themselves

BORNEOL

with tillage and the collecting of gutta-percha, resin, gums, rattans, gold dust, and wax. They are divided into numerous tribes. The Malays (taking the name ethnographically) dwell on the coasts, are traders and bold sailors. They are more civilized than the Dyaks, cultivate the grounds around their houses, lay out gardens, keep cattle, and live partly by fishing. The Chinese, chiefly from Canton, have penetrated far into the interior. They engage in trade and mining, are unwearied in their efforts to make money, and then return to their native country. They have always endeavored to live as independent republics (*kong-si*) under chiefs chosen by themselves, and according to Chinese laws. In 1857 the Chinese living in Sarawak rebelled, and were nearly exterminated. The Dutch were also compelled to put them down by force of arms, and have imposed a poll tax. The women of Borneo, except the Dyak, weave cotton fabrics, make earthenware, baskets, and mats of beautiful designs and colors. In the district of Banjarmassin are factories of weapons. The principal exports are gold, gold dust, diamonds, coal, rattans, gutta-percha, edible nests, cotton, wax, timber, dye-woods, mats, resins, sandalwood, camphor, etc.; the imports, earthenware, iron, steel, and copper work, piece-goods, yarns, woolen and silk fabrics, medicines, provisions, wines, spirits, rice, sugar, tea, tobacco, opium, trepang, gambir, gunpowder, etc.

Divisions.—Borneo has never formed a political unity, and there is no native designation for the island as a whole. The name Borneo (Burnei or Brunei) in fact properly applies only to the Malay kingdom on the north-west coast; and Kalamantan or Kalamantanin, sometimes quoted as a general appellation, is also of limited purport. Borneo originally included nearly the whole of the northwest of the island. The sultan has absolute authority. In 1847 he undertook not to surrender any of his territory to any other power without the sanction of the British government. The capital, Brunei, 20 miles from the coast, on the river of the same name, has at the most 20,000 inhabitants; whereas it was credited by Pigafetta (16th century) with 25,000 houses. The total population of the country within its present limits may be stated at 160,000. Its area was reduced by the erection of Sarawak into a practically independent principality by Sir James Brooke (1841-68), and by the establishment of the British North Borneo Company as a recognized governing body. The company's charter, granted in 1881, transferred to them rights originally obtained by an American in 1865. This territory consists partly of a portion of the old kingdom of Brunei, partly also of districts on the east coast, claimed by the sultan of the Sulu Islands. Against the British occupation of the Sulu territory a protest was made by Spain, which had for some time been gradually incorporating the sultan's possessions. As a matter of fact the British North Borneo Company has been successful in appropriating and developing its territory, which, with an area of 30,709 square miles, and a coast line of 900 miles, is now divided into the East Coast Residency and the provinces of Dent, Keppel, and Alcock, and has its capital at Elopura or Sandakan, the largest settlement, with 5,000 inhabitants. The population of the territory is estimated at 200,000. By far the largest part of the island is ruled directly

or indirectly by the Dutch, who have divided it into the residency of the western division of Borneo, and that of the southern and eastern, the former having Pontianak as the seat of government, the latter Banjarmassin. Besides a number of smaller dependencies, the western division contains the kingdom of Landak, Tayan, Mampawa, Sukadana, Simpang, Matan, Sekadow, Sintang, Sambas. Among the separate states which go to form the southern and eastern divisions are Kotaringin, Banjarmassin, and Martapura. In consequence of a decree of the Sultan of Banjarmassin, the district watered by the Great Dyak or Kahayan is preserved for the native tribes, who in 1879 were estimated at 18,000 souls; Chinese, Malays, etc., are forbidden to ascend the river higher than the Kanpore Pilany. The same is the case with the basins of the Kapuas, Murug, known as the Little Dyak district. The population of the whole of the Dutch portion of the island on 31 Dec. 1909, was 1,300,000, of whom a few were Europeans, but most were natives, Chinese, Arabs, and miscellaneous Orientals. In the number of natives are included from 200,000 to 300,000 Malays settled along the coast, who used, formerly, to be counted among the strangers. The island of Labuan, off the coast of Brunei, has belonged to the British since 1846.

The Chinese had commercial dealings with Borneo as early as the 5th century, but they made no settlement for a long time after. The Malay kingdom of Borneo proper dates back to the 13th century. Another Malay settlement of later origin, Sambas, was at first dependent on Johore in the Malay peninsula. Sukadana was founded by Hindu Javanese from the kingdom of Majapahit (see JAVA) and spread its influence on the whole southern part of the west coast. Mampawa was a Buginese settlement, and Pontianak was founded as late as 1771 by a colony of Arabs, Malays, and Buginese. Islam began to be preached by Arabs from Palembang in the 16th century.

The Portuguese effected a settlement in 1690 at Banjarmassin; from thence they were, however, soon expelled. The Dutch succeeded in concluding a treaty of commerce with the princes of Banjarmassin. They erected a fort and factory in 1643, and a second in 1778 at Pontianak. The British made unsuccessful attempts in 1702 and 1774 to effect a settlement in Borneo, but, during the 19th century they acquired a preponderating influence on the north-west coast.

Borneol, or **Borneo Camphor**, a crystalline organic compound, often used as a substitute for common or laurel camphor. Borneol is obtained from a tree indigenous to Sumatra, Borneo, and Labuan, being deposited in crystals in cracks in the wood. To obtain it the tree is cut down, and the longitudinal fissures are opened, and the camphor removed. Large trees often yield only from 3 to 11 pounds; and owing to the reckless manner in which the trees have been destroyed without the planting of others, the Sumatran forests now contain few that are worth working. Borneol has the chemical formula $C_{10}H_{17}.OH$, and it may be prepared from common camphor by the action of reducing agents. It is not so volatile as common camphor, and is also harder. It is but slightly soluble in water, although it dissolves freely in alcohol and ether. When distilled with phos-

porous pentoxide, borneol is converted into one or more terpenes, prominent among which is borneo-camphene or borneène ($C_{10}H_{16}$). Pure borneol sinks in water, while common camphor floats.

Born'holm, a Danish island in the Baltic Sea, nearly surrounded with rocks; situated in lat. $55^{\circ} 10' N.$; lon. $15^{\circ} E.$; about 24 miles long, and 16 broad; pop. 35,364. It is stony but fertile; yields oats and butter; has excellent pastures; and also mines of coal, marble quarries, and fisheries. The island has long been famous for its rock-crystals.

Bornier, Henri, òn-rē bôr-nē-ā (VICOMTE DE, vè-kònt dè), French dramatist: b. Lunel, 25 Dec. 1825. His plays are notable for splendor of diction. Among them are 'Luther's Wedding' (1845); 'Dante and Beatrice'; 'The Daughter of Roland.' He twice won the prize of the Academy, with the lyrics, 'The Isthmus of Suez' (1861); and 'France in the Extreme East' (1863). He is the author of several successful novels and romances, and is a member of the Academy.

Bor'nite, a native sulphide of copper and iron, containing these metals in various proportions. The mineral crystallizes in the isometric system, and its crystals have the formula $3Cu_2S.Fe_2S_4$. It is reddish brown in color when freshly broken, but speedily takes an iridescent tarnish. Its hardness is 3, and its specific gravity from 4.9 to 5.4. The massive varieties contain from 50 to 70 per cent of copper, and the mineral constitutes a valuable ore of that metal. Bornite occurs abundantly in a copper-mine at Bristol, Conn. Bornite occurs in many western copper mines, as at Butte, Mont., and in Colorado, being at times highly argentiferous. It abounds in Chile, Peru, Mexico, Canada and many other countries.

Bornou', a kingdom of Central Africa, lying between lat. 10° and $15^{\circ} N.$, and lon. 12° and $16^{\circ} 30' E.$; bounded north by Kanem and the desert, east by Lake Chad, south by Mandara, and west by Sudan. From March to July the heat is extreme, the thermometer rising to 107° and rarely falling below $86^{\circ} F.$; during this time scorching winds from the south prevail. As in other tropical countries the seasons are divided into the dry and rainy: the latter continues from March to October, when the air becomes milder and fresher. The country is populous, containing 13 principal towns. These are generally large and well built, with walls 40 feet high, and about 20 feet thick. The houses consist of several courtyards, with apartments for slaves, habitations for the different wives, and several turrets connected by terraces, forming the apartments of the owner. The Bornou people, or Kanuri, have negro features; they are peaceable and industrious, practising agriculture and various mechanical arts. The government is an absolute monarchy, with certain constitutional forms, and the sultan or mai can, it is said, muster a well-equipped army of 25,000 or 30,000 men, partly cavalry, armed with musket, rifle, sabre, etc. Indian corn, cotton, and indigo are the most valuable productions of the soil. Fruits and vegetables are also raised. The domestic animals are asses, camels, horses, dogs, sheep, goats, and oxen. Lions, leopards, hyenas, jackals, elephants, and buffaloes roam

the forests. The crocodile and hippopotamus are considered a luxury. The ostrich, pelican, crane, and guinea-fowl abound. Locusts often appear in great clouds, and are eaten by the natives. The capital is Kuka, near the shore of Lake Chad. Bornou belongs to the British sphere of influence. Estimated pop. 5,000,000.

Boro Budor, bō-rō boo-dōr (the 'Great Buddha'), the ruin of a temple in Java, near the junction of the Ello and Progo, the most elaborate monument of the Buddhist style of architecture anywhere existing. Javanese chronicles ascribe the building of the temple to the beginning of the 7th century; there are no inscriptions, but it was probably finished between 1400 and 1430. Boro Budor is built on a low hill between four vast volcanoes which supplied the blocks of trachyte of which the edifice is built; its height to the cupola is 118 feet. It is a pyramid of a square form, each side at the base measuring 520 feet, and consists of seven walls, which are built like the steps of a stair, up a hill. Between the walls are narrow terraces running round the building; in each is an arched doorway leading to the next higher terrace. These walls are richly ornamented with statuary. Outside are over 400 niches topped with fantastic domes, and each occupied by a large statue of Buddha. Between each of these are bas-reliefs, including figures of the god seated, and architectural ornaments and carvings of all sorts. Below the niches, on the lower story, is an immense bas-relief running round the whole building, representing scenes from the life of Buddha, and religious subjects. The inner faces of the building are also profusely ornamented with bas-reliefs, representing battles, sea-fights, processions, and chariot races, carried to an extent unrivaled by any other building in the world. Of the large reliefs alone there are over 2,000; and most of them are as vigorously designed as they are carefully executed. Within the upper square terrace are three circular ones, the outer ornamented with 32, the next with 24, and the upper with 16 small bell-shaped shrines (*dagops*), each containing a seated statue of Buddha, which can be seen through the open works of their roofs. The whole is surmounted by a cupola, the principal and probably the most ancient part of the structure. It is now empty, a sunken chamber, 10 feet deep, representing what was, no doubt, a *dagop* intended to contain the precious relic for which this splendid temple was erected. The niches containing the cross-legged figures have been supposed to be a copy, in durable architecture, of the cells of a Buddhist monastery, each occupied by a shaven priest; the cupola is rather to be classified with the topes or stupas of Afghanistan. The structure is thus a compound of a tope with a copy, in durable architecture, of the frail cells of a vihara.

Borodin, bō-rō'dën, Alexander Porfir'yevich, pōr-fēr-yā'vich, Russian composer: b. St. Petersburg, 12 Nov. 1834; d. there, 27 Feb. 1887. He studied medicine and chemistry, and was made professor of chemistry at the Medico-Surgical Academy of St. Petersburg. He was at the same time an excellent musician, one of the chief representatives of the new Russian school. His chief works are two symphonies and 'In Central Asia.' His opera, 'Prince Igor,' which he had not completed at his death

was finished by Rimsky-Korsakoff and Glazounoff, and was brought out in St. Petersburg in November 1890.

Borodino, bō-rō-dē-nō, Russia, a village 70 miles west of Moscow; on the Kaluga, an affluent of the Moskwa. It gave name to the great battle fought between the French army under Napoleon and the Russians under Kutusoff, 7 Sept. 1812. The battle of Borodino was one of the most obstinately disputed in history, and the loss on both sides was almost equally great. Out of 257,000 men engaged, between 70,000 and 80,000 were killed and wounded. The Russians retreated on the following day, but in the most perfect order, and therefore claim this battle as a victory; but the French, who name the battle from the Moskwa, have always maintained a similar claim.

Boroglyceride, -glis'- (from "boron" and "glycerine"), an antiseptic substance, soluble in alcohol and in 40 parts of water, and containing about 25 per cent of borate of glycerine ($C_3H_5BO_3$), the remaining 75 per cent consisting of free boric acid and glycerine in equivalent proportions. Boroglyceride is considered harmless, and is much used in the preservation of fruits and wines, and other articles of food.

Boron (from "borax"), one of the non-metallic elements. In nature it is never found in the uncombined or elementary state, though it occurs abundantly in combination with other elements, especially in regions that are or have been volcanic. The principal compounds of it that are found in nature are borax and boric acid (qq.v.). It is a constituent of numerous other minerals, but most of these have but little commercial importance. Boron was first obtained in the elementary state about the year 1808, by Gay-Lussac and Thénard in France, and by Sir Humphry Davy in England. Gay-Lussac and Thénard prepared the element by heating boric acid very strongly until all its water was expelled, and then heating the resulting substance (now known as boric acid) with metallic potassium. The potassium removed the oxygen from the boric acid, setting the element boron free. When thus prepared boron is an opaque amorphous powder of a greenish-brown color. It has neither taste nor odor, but it stains the fingers strongly. Owing to its finely divided condition it is apt to take fire spontaneously; but if it is consolidated by pressure it is not affected by the air at common temperatures, though it burns with a reddish light when heated. It is not affected by water save that water will dissolve a slight amount of it when it is freshly prepared. Strong nitric acid will dissolve it in the cold, and hot sulphuric acid attacks it also. It is one of the few substances that will combine directly with nitrogen, which it does when heated in that gas. The atomic weight of boron has not been determined with satisfactory precision, but Clarke gives 10.97 as the best result obtainable from the existing data. The amorphous boron described above is soluble in melted aluminum, from which it crystallizes out on cooling. The crystals so obtained were formerly thought to consist of pure boron, but it has been shown that they always contain a definite amount of aluminum. These crystals may be obtained of such hardness that they will scratch both corundum and the

ruby, the diamond being the only substance that exceeds them in this respect. The specific gravity of amorphous boron has not been satisfactorily determined, but it appears to exceed 1.84. The specific gravity of the crystals obtained as described above is said by Miller to be 2.68. The specific heat of boron varies considerably with the temperature. At 250° C. it is .37, and at 1,000° C. it is probably 0.5. Boron is a non-conductor of electricity.

Bororós, bō-rō-rōs', a tribe of South American Indians of the Tupi or Guarani stock, variously reported from a few hundred to a few thousand, living in southwestern Brazil around the headwaters of the Parana and Paraguay, the small remnants of a once powerful race, thinned by old Portuguese slave raids and disease. They live in villages and do some planting, but live mainly by hunting with long bows and bone-tipped arrows. They are exceptionally tall, averaging over five feet eight inches, and athletic, and are reported to practice both polygamy and polyandry, but little is really known of them.

Borough, in England, either an incorporated municipality with an organized government and a charter of special privileges (municipal borough), or a district represented by a member of Parliament (parliamentary borough). The *burgh* (hill) was originally a hill-fort; then the settlement around it, with its own court, and head officer called a "port-reeve." Under the Norman dynasty the port-reeves were replaced by royal officers, and the boroughs gradually received special charters and were governed by their leading guilds. As their support came to be needed by the governing factions they were given representation in Parliament; and under the Tudors, especially Mary, small boroughs in great profusion were created expressly to return members in the government interest. This was stopped under Elizabeth. Besides these the older boroughs decayed till they had little or no population, but were allowed to keep their parliamentary power to strengthen the aristocratic and land-owning interest, the proprietors of the sites returning whom they chose: these were called "rotten boroughs," and the chief was "Old Sarum" (that is, Old Salisbury), with not a single inhabitant but two members of Parliament. Others had only one. Those somewhat larger, but still so small as to be at the dictation of some one person or family, were called "pocket boroughs." The Reform Bill of 1832 swept away the worst of these anomalies.

In the United States the term is now restricted to certain incorporated villages below the rank of cities in four States — Connecticut, New Jersey, Minnesota, and Pennsylvania; and is practically synonymous with "town" in most other States, and with "village" in Ohio. At the beginning of colonization the natural idea was to transplant the English borough system to America; but the conditions of settlement and government made it generally inapplicable. In Virginia the term was applied in the sense of "parliamentary borough," to districts made up of hundreds and plantations, having representation in the House of Burgesses, of which in 1619 there were 11; but the municipal borough did not take root there. Lord Baltimore and William Penn were empowered to establish the latter in

their colonies of Maryland and Pennsylvania; but the former did not avail himself of it at all, and the latter very little, nor his heirs after him. After the Revolution, however, the Pennsylvania legislature granted special borough charters freely, and in 1834 passed an act empowering courts of quarter sessions to grant them; in 1851 a general act for their creation and regulation was passed. In New Jersey they were created by special charters as early as the beginning of the 18th century, and in 1818 a general act was passed. In Connecticut they have always been created by the legislature, in special acts. In Minnesota and Pennsylvania the boundaries of the borough are coterminous with the township, forming one of the primary county divisions; in Connecticut and New Jersey the borough is only a village government within a town, which in all cases is a separate body including the borough; the latter being only the thickly settled portion within the range generally of the postal, fire, etc., departments, and governed by a warden and burgesses, corresponding to the mayor and single-chamber council of a city.

A still further extension was given to the term by the New York legislature in 1897, when the city of Greater New York was constituted of five "boroughs"—Manhattan, Brooklyn, Queens, The Bronx, and Richmond.

Borough-English, in law, a mode of descent in some ancient boroughs and manors, in which the owner's youngest son, or his youngest brother (if he has no issue), is the heir. It is evidently a custom of Saxon origin, and is so named to distinguish it from the Norman customs. It still holds in a few places.

Borromeoan (bō-rō-mā'an) **Islands**, four small islands in a bay of Lago Maggiore, north Italy, belonging to the Borromeo family, and named respectively Isola Bella, Isola Madre, Isola dei Pescatori, and L'Isolino. The Isola Madre lies farthest from the shore of the lake. It is laid out in seven terraces, rising one above the other, with charming walks and a mansion on the top. The Isola Bella contains a handsome and extensive palace, with private chapel and picture gallery, the fine gardens adjoining being laid out upon 10 terraces rising above each other. The island was formerly little more than a barren rock and much soil required to be brought from the mainland. The Isola dei Pescatori is mostly occupied by a fishing village. Magnificent views of the surrounding scenery are obtained from these islands.

Borromeo, bō-rō-mā'o, **Carlo** (COUNT), saint and cardinal of the Roman Catholic Church: b. Arona, Italy, 2 Oct. 1538; d. 3 Nov. 1584. He studied law at Pavia; was in 1559 made doctor, and in 1560 was successively appointed by his uncle Pius IV. apostolical protonotary, referendary, cardinal, and archbishop of Milan. As legate over Romagna, the March of Ancona, and Bologna, he had a great share in the civil government: as protector of Portugal, of the Netherlands, of Switzerland, of the Franciscans, Carmelites, and of the Knights of Malta, he administered several important branches of the spiritual government of the Pope, who created him his grand penitentiary, and did nothing of importance without his advice. The re-opening and the results of the Council of Trent, so advantageous to the papal authority, were chiefly

effected by the great influence of Borromeo. He did much for the embellishment of the papal buildings, employing even his own fortune for that purpose, and established many excellent institutions as archbishop of Milan; improved the discipline of the clergy, founded schools, seminaries, an order of secular priests (oblates), libraries, and hospitals, and was indefatigable in doing good. During the pestilence which raged in Milan in 1576 he distinguished himself by his heroic devotion to his flock. As soon as the scourge appeared in the city he hastened from a distant part of his diocese, where he was making a pastoral visitation, and spent all his energies in giving bodily aid and spiritual consolation to the plague-stricken inhabitants. All his virtues, however, could not save him from persecution and calumny: he was even severely attacked by the government, but no charge could be proved against him. Miracles were said to have been wrought at his tomb immediately after his death, and his canonization took place in 1610.

Borromeo, Federigo, fā-dā-rē'gō (COUNT), cardinal, and archbishop of Milan, nephew of St. Charles: b. Milan, 1564; d. 22 Sept. 1631. He founded the Ambrosian Library at Milan in 1609, and devoted to it most of his fortune. He sent emissaries to several countries to collect manuscripts for it. He added to it a printing establishment, and founded academies, schools, and charitable institutions. When Milan was desolated by a pestilence in 1630, Federigo showed the same heroism as his uncle Carlo had done during that of 1576.

Borromini, Francesco, frān-chēs-kō bōr-rō-mē'nē, Italian architect: b. Bissone, 1599; d. (by his own hand) 1667. He studied sculpture in Milan and architecture in Rome under Maderno, architect of St. Peters. After Maderno's death he was a pupil of Bernini, by whom he was employed on various parts of St. Peters. He built the church of San Ivo alla Sapienza, the Oratory and Cloister of San Filippo Neri, the façade of the church of Santa Agnese in the Piazza Navona, and the interior of San Giovanni in Laterano. He was one of the chief representatives of the baroque style. Borromini conceived an unreasoning hatred for his instructor Bernini and determined to surpass him in his art, but maddened by the latter's success he committed suicide.

Borrow, George, English traveler, linguist, and writer on gypsy life: b. East Dereham, Norfolk, 1803; d. Oulton Broad, Suffolk, August 1881. On his father's side he was descended from a Cornish family, and his mother was of French extraction. His father was a recruiting officer who constantly changed his residence, and thus Borrow's early years were passed in various parts of the United Kingdom. He received part of his education in Edinburgh High School, and in 1820 was articled to a Norwich solicitor. It was about this time that he laid the foundation of his linguistic knowledge under the guidance of William Taylor, a friend of Southey. After his father's death he went to London, where he earned his livelihood by literary hackwork; but, soon tiring of this, he set out on a series of journeys through England, France, Germany, Russia, and other countries, acting latterly as agent of the British and Foreign Bible Society and making gypsy life and

BORROWING DAYS—BOSANQUET

customs a special study. During the seven years or so prior to his engagement by the Bible Society he seems to have suffered great privations, but of his movements at that time he has told us nothing. He married in 1840, and settled on a small estate of his wife's at Oulton Broad, in the northeast of Suffolk, where he died. He maintained to the last his strong sympathy for gypsy life, and not only permitted but encouraged the gypsies to encamp on his estate. His best known work is 'The Bible in Spain' (3 vols. 1843); and his other publications include 'Targum: or, Metrical Translations from Thirty Languages and Dialects' (1835) 'The Zincali: or, an Account of the Gypsies in Spain' (1841); 'Lavengro, the Scholar, the Gypsy, the Priest' (1851), a sort of idealized autobiography; 'The Romany Rye,' a sequel to 'Lavengro' (1857); 'Wild Wales, Its People, Language, and Scenery' (1862); and 'Romano Lavo-Lil' (1874), a dictionary of the gypsy language. Borrow was a strong, manly character, delighting in the free, open-air existence of the gypsies whose life he knew so well, and despising heartily all affectation and false gentility. His later works, by their outspokenness, lost him much of the reputation earned by his 'Bible in Spain.' See the 'Life Writings, and Correspondence' by Dr. Knapp (2 vols. 1899).

Borrowing Days, the last three days of March, Old Style; the popular notion being, in Scotland and some parts of England, that they were borrowed by March from April. The fiction is of great antiquity, and probably arose in the observation of a frequent wintry relapse about the end of March.

Borrowstounness' (popularly pronounced and now often written Bo'ness), a town in Linlithgowshire, Scotland, distant 17 miles west by north of Edinburgh. It is situated on a low peninsula, washed by the Forth, and possesses three principal streets running from west to east, one of them a continuation of the other two. The chief industrial establishments are potteries, iron-foundries, engineering shops, chemical manure works, saw-mills, timber-yards, coal and coke works, distilleries, brick-fields, etc., and in the vicinity are very extensive collieries. A new dock has recently been constructed and the old harbor improved, hydraulic hoists and other appliances being provided. The wall of Antoninus ran through Borrowstounness, and traces of it are still visible. Pop. (1901) 9,100.

Borsip'pa, a very ancient city of Babylonia, the site of which is marked by the ruins Birs Nimrud.

Bort, a rounded, translucent variety of diamond, harder than the distinctly crystallized gem variety. It is of much value as an abrasive.

Bortnyanski, Dmitri Stepanovitch, dmé'trē stēp-ān'ō-vich bort-nyān-ske, Russian composer: b. Glukhov, 1751; d. St. Petersburg, 9 Sept. 1825. He received his education at Moscow and at Venice and other Italian cities, under Galuppi. In 1779 he returned to Russia and was appointed director of the Imperial Chapel, devoting himself to the improvement and training of the choir. His compositions are almost entirely church music, including 35 sacred concertos, a liturgy for three voices, and a collection of psalms. His music, combining the

spirit of both the Slavic and the Italian, is thoroughly original and made an epoch in Russian church music.

Bory de Saint Vincent, Jean Baptiste George Marie, zhōn bāp-tēst zhōrhz mā-rē bō-rē dē sǎn vān-sōn, French naturalist: b. 1780; d. 1846. About 1800-2 he visited the Canaries, Mauritius, and other African islands. He afterward served for a time in the army, and conducted scientific expeditions to Greece and to Algiers. Among his chief works are 'Annales des Sciences Physiques' (8 vols. 1819-21); 'Voyage dans les Quatre Principales Iles des Mers d'Afrique' (3 vols. 1804); 'Expédition Scientifique de Morée' (3 vols. 1832); 'L'Homme, Essai Zoologique sur le Genre Humain' (2 vols. 1836).

Borysthenea, bō-ris'thēn-ēs, the ancient name of the Dnieper.

Borz'oi, or **Russian Wolfhound**, a hunting-dog of northern Europe, substantially the same as the ancient long-haired greyhound of the Arabs and Persians, whose coat has been lengthened in adaptation to a cold climate. It is a lithe, active dog, standing 28 inches high at the shoulders, and upward, and weighing from 75 to 100 pounds. Its hair is silky and loose, especially so on the tail, which, contrary to the other greyhound characteristics, is "feathered" longer than is the setter's, which it very much resembles. It has large padded feet. In color the borzois are combinations of black, white, and tan. These dogs are popular, especially as stately attendants upon ladies, and good specimens may be seen at all the principal kennel shows of the country.

Bos, Lambert, Dutch philologist: b. Worum, Friesland, 23 Nov. 1670; d. 6 Jan. 1717. He was instructed by his father in Greek and Latin. Vitringa, the distinguished Oriental scholar, was professor at Franeker, and thither young Bos went to pursue his philological studies. Not long after he was chosen Greek professor in that university. He is best known by his work entitled 'Ellipses Græcæ' (1702), though he was the author of several others, among which may be mentioned an edition of the Septuagint and 'Animadversiones ad Scriptores Græcos.'

Bosa, a seaport on the west coast of Sardinia, province of Cagliari, built partly on the side of a hill crowned by an old castle, and partly in an unhealthy plain. It has a cathedral and other churches, a theological seminary, and is the residence of a bishop, suffragan to the archbishop of Sassari. It is in a wine and oil producing region and carries on coral fishing and tanning.

Bosanquet, bo-sān-ka, **Bernard**, English philosopher: b. 1848. He was lecturer at University College, Oxford, 1871-81, and from 1881 to 1897 was much engaged in university extension lecturing and charity organization. He has written 'Logic, or Morphology of Knowledge'; 'History of Aesthetic'; 'Knowledge and Reality'; 'Essays and Addresses'; 'Civilization of Christendom'; 'Essentials of Logic'; 'Aspects of the Social Problem'; 'Psychology of Moral Self'; 'Companion to Plato's Republic, for English Readers'; 'Education of the Young in Plato's Republic'; 'Philosophical Theory of the State.'

Bosc, Louis Augustin Guillaume, French naturalist: b. Paris, 29 Jan. 1759; d. there, 10 July 1828. Employed in various public offices until 1793, his political sympathies made him obnoxious to the terrorists, and concealing himself in the forest of Montmorency, he resumed there, under the greatest difficulties, his favorite science of botany, having already previously gained some distinction as a naturalist. On returning to Paris after the fall of Robespierre he was sent in 1796 as French consul to the United States; but, not recognized in this position by the American authorities, he explored the country for scientific purposes. In 1799 he was appointed chief of the administration of prisons, but lost this office on the 18th Brumaire. Applying himself thenceforward to literary labors, he made numerous contributions to natural science. His '*Histoire Naturelle des Coquilles*' (5 vols. 2d ed. Paris 1824) and '*Historie des Vers et des Crustacées*' (2 vols. 2d ed. Paris 1829), and his studies on the vines of France, are his principal achievements. He was made a member of the Academy of Sciences, of the Central Agricultural Society, and finally, after having been inspector of the gardens at Versailles, he became professor at the Jardin des Plantes at Paris. Roland, under whose administration he had served, and who perished with his wife on the guillotine, made him guardian of their daughter. Bosc published memoirs of the celebrated Madame Roland, and succeeded in obtaining for Mlle. Roland the confiscated property of her unfortunate parents.

Boscan Almogaver, Juan, Spanish poet: b. Barcelona, about 1493; d. near Perpignan, April 1542. His parents, who belonged to the most ancient nobility, gave him a careful education. He followed the court of Charles V. and in 1526 was attached to it for some time in Granada. His noble manners and character gained him the favor of the emperor, and the education of the Duke of Alva was committed to him. After his marriage Boscan lived at Barcelona, occupied in publishing his works, together with those of his deceased friend Garcilaso, in which task he was employed at the time of his death. Boscan first introduced Italian measures into Spanish, and thus became the creator of the Spanish sonnet. He published his poetical works in 1543. His poems are still esteemed, the best edition being that published at Madrid in 1875. Among his works are '*Leandro y Hero*' and '*La Alegoria*.'

Boscawen, Edward, British admiral: b. Cornwall, England, 19 Aug. 1711; d. near Guildford, Surrey, 10 Jan. 1761. He was a son of Viscount Falmouth. Having entered the navy he distinguished himself at Porto Bello (1740) and Cartagena (1741), where he stormed a battery at the head of a part of his crew. In 1744 he was promoted to the Dreadnought, a 60-gun ship, in which he took the French frigate Medea. Three years afterward he signaled himself under Anson, at the battle of Cape Finisterre. Toward the close of this year he was appointed commander-in-chief by sea and land in the East Indies, and was despatched thither with a squadron. He failed in attempts on Mauritius and Pondicherry, and in 1750 returned to England, where he obtained a seat at the admiralty board. In 1755 he became vice-admiral and sailed for North America, and in

an action with a French squadron two ships of the line fell into his hands. It was he who signed the immediate order for the execution of Byng in 1757. In 1758 he was promoted to the rank of admiral of the blue, and in conjunction with Lord Amherst, who commanded the land forces, he was present at the capitulation of Louisburg. The year following, having then the command in the Mediterranean, he pursued the Toulon fleet, under De la Clue, through the Straits of Gibraltar, and coming up with it in Lagos Bay, completely defeated it, burning two ships and taking three. For these services he received the thanks of Parliament and \$15,000 a year, with the rank of general of marines, in 1760.

Bosch, Balthazar van den, Dutch painter: b. Antwerp, 1681; d. 1715. The first work which brought him into notice was an equestrian picture of the Duke of Marlborough, executed in concert with Van Bloemen, who painted the horse. He was afterward employed on a number of works, for which he is said to have received as high prices as Teniers or Ostade; and a short time before his death was appointed director of the Academy of Antwerp.

Bosch, Ernst, German painter: b. Crefeld, 1834. He studied under Schex at Wesel and at the academy in Düsseldorf. His works show a pleasing combination of figure, animal, and landscape painting; many of his pictures excel in humor. Among his best paintings are '*The Smuggler*'; '*Defense of a Block-house against Indians*'; '*Gipsy Gang in the Village*'; '*The Rogues' School*'; '*Hermann and Dorothea at the Spring*.'

Bosch, Hieronymus, Dutch painter and engraver: b. Bois le Duc, Netherlands, about 1462; d. there 1516. His fancy partook of the grotesque, Gothic character of the Middle Ages, and his pictures are ingenious representations of devils, spectres, and the torments of the lost. Some of his works, however, representing scriptural scenes, possess greater dignity. His engravings resemble his paintings, and have become very scarce.

Boschbok, the Dutch form of the English name "bush-buck," given to several South African antelopes, specifically the *Tragelaphus sylvaticus*. It is prized for its venison.

Boschvark, the bush-hog or bush-pig of South Africa (*Charopotamus* or *Potamocharus africanus*), one of the swine family, about five feet long, and with very large and strong tusks. The Kaffirs esteem its flesh as a luxury, and its tusks, arranged on a piece of string and tied round the neck, are considered great ornaments.

Boscobel, England, a parish in Shropshire, unimportant in itself, but remarkable historically as the hiding place of Charles II. for some days after the battle of Worcester, 3 Sept. 1651. Boscobel House belonged at the time to a staunch royalist, and as it was judged a convenient place of retreat, Charles at once proceeded in that direction, and hid himself during the day in the thickest part of the wood. After making one attempt to escape from England through Wales, he was compelled to return again to his former hiding-place, and concealed himself among the branches of a pollard oak in Boscobel Wood, where it is related that he could actually

BOSCOVICH — BOSNIA

see the men who were in pursuit of him, and hear their voices. The "royal oak" which now stands at Boscobel, is said to have grown from an acorn of this very tree. An account of Charles' adventures after the battle of Worcester was published in 1662, with the title, 'Boscobel, or the Compleat History of his Sacred Majestie's most Miraculous Preservation after the Battle of Worcester.' This history is said to have been the work of Thomas Blount.

Boscovich, Roger Joseph, Italian astronomer and physicist: b. Ragusa, Dalmatia, 18 May 1711; d. Milan, 12 Feb. 1787. He was educated among the Jesuits, and entering into their order, was appointed professor of mathematics in the Roman College, before he had entirely completed the course of his studies. He was employed by Pope Benedict XIV. in various undertakings, and in 1750 began the measurement of a degree of the meridian in the Ecclesiastical States, which operation occupied him for two years. He afterward visited the Pontine Marshes, to give advice respecting the draining of them. He was then intrusted by the Republic of Lucca with the defense of its interests, in a dispute about boundaries with the government of Tuscany. This affair obliged him to go to Vienna, and having terminated it with success, he visited Paris and London. He was elected a Fellow of the Royal Society, and dedicated to this body a Latin poem on eclipses. Returning to Italy, he was appointed mathematical professor in the University of Pavia; whence, in 1770, he removed to Milan, and there erected the celebrated observatory at the College of Brera. On the suppression of the order of Jesuits, he accepted an invitation to France from Louis XV., who gave him a pension of 8,000 livres, with the office of director of optics for the navy. This appointment induced him to pay particular attention to that part of optical science which treats of the theory of achromatic telescopes, on which subject he wrote a treatise of considerable extent. He was obliged to leave Paris in 1783, on account of ill health, when he retired to Milan. He was one of the first among continental philosophers to adopt the Newtonian theories. An edition of the works of Father Boscovich was published by himself at Bassano, in 5 volumes, 4to, 1785. His 'Theoria Philosophiæ Naturalis reducta ad Unicam Legem Virium in Natura Existentium,' first published in 1758, is a curious production containing speculations of which Dr. Priestley availed himself in his writings in favor of materialism. He wrote also 'De Maculis Solaribus.'

Bosio, Angiolina, Italian opera singer: b. Turin, 22 Aug. 1829; d. St. Petersburg, 12 April 1859. At an early age she showed so decided a taste for music, that her parents were induced to place her under the instruction of Cattaneo, at Milan. The best evidence of her progress and talent for singing, was her début in her 15th year at Milan, in Verdi's 'Due Foscari,' with decided success. Thenceforth a series of triumphs awaited her.

Bosio, François Joseph (BARON), French sculptor: b. Monaco, 19 March 1769; d. Paris, 29 July 1845. He was much employed by Napoleon I., for whom he executed busts of Josephine and Hortense, and by the successive Bourbon and Orleans dynasties. His works are well known in France and Italy.

Bosna-Seraï, or Serajevo (ancient TIBERIOPOLIS), formerly capital of the province of Bosnia, now of the Austro-Hungarian district of Serajevo, situated on the Miliatzka, which is here crossed by a handsome stone bridge, 122 miles southwest of Belgrade, and 570 miles west-northwest of Constantinople. The town was founded about 1263. It is well built, and although most of the houses are of wood, has a gay and pleasant appearance from the number of towers and minarets with which it is embellished. Many improvements have been introduced since the Austrian occupation. It contains a *serai* or palace, built by Mohammed II., to which the city owes its name; many mosques, great and small; churches, monasteries, two large bazaars, schools, baths, and charitable institutions. It was formerly surrounded with walls, but these are now completely decayed; and its only remaining defense is a citadel, built on a rocky height at a short distance east from the town, mounted with cannon. Serajevo is the chief mart in the province, the centre of commercial relations between Turkey, Austria, and South Germany; and has, in consequence, a considerable trade. It has manufactures of arms and utensils of copper; ironware, woolen and worsted stuffs, morocco leather, cottons, etc. There are also several tanneries in the city, and at a short distance from it several important iron mines; and on a plain which stretches to the west the baths of Serajevsko. Pop. 26,286.

Bosnia (properly BOSNA), the extreme northwestern province or eyalet of European Turkey, comprising Bosnia proper, Herzegovina, and parts of Turkish Croatia and Dalmatia, bounded north by the river Save, west by Dalmatia and the Adriatic, east by Servia, and south by Albania and Montenegro. By the terms of the Treaty of Berlin (1878), it was occupied by Austrian troops for administration and Austrian sovereignty was formally announced, 5 Oct. 1908. It comprehends, besides the ancient Bosnia, part of Croatia, a tract of Dalmatia, and Herzegovina, and contains from 23,000 to 24,000 square miles (of which Bosnia proper occupies 16,200). The inhabitants are mostly of Slavonian origin, and comprise Bosniaks, Servians, Morlaks, and Croats, besides Turks, Greeks, Jews, Gypsies, etc. The Bosniaks are the most numerous. They are partly Mohammedans, partly Roman and Greek Catholics. The Servians and Croats are next in point of number. The country is level toward the north; in the south mountainous and woody. Its chief rivers are the Save, the Verbas, the Bosna, Rama, and Drina. Bosnia contains fertile fields, orchards, and vineyards; the breed of cattle is excellent, and the mountains furnish good iron, of which a great part is manufactured in the country into guns and blades. The other articles manufactured are leather, morocco, and coarse woolen cloths. In the 12th and 13th centuries Bosnia belonged to Hungary. In 1339 it fell into the hands of Stephen, king of Servia. After his death it remained independent, and the Ban Twartko took the title of king in 1370. In 1401 it became tributary to the Turks, and since 1463 has been a Turkish province. It is divided into the southern and northern parts, or Upper and Lower Bosnia. The former is commonly called Herzegovina (q.v.). The capital of Bosnia is

BOSPORUS — BOSSE

Bosna-Serai (q.v.); **Zvornik**, **Banyaluka**, **Mostar**, and **Travnik** are also important places. The Bosniaks are boorish in their manners and uncourteous toward strangers, but industrious and temperate. The women, like the men, are well and strongly made, and mostly good-looking. The Bosniaks are fond of hunting and fishing, and engage to some extent in agriculture and cattle-raising. Servian is the language generally spoken. Bosnia has often attempted to throw off the Turkish yoke, and after the Russo-Turkish war of 1877-8, which was led up to by an insurrection in Herzegovina and Bosnia, the provinces were with the consent of the great powers occupied by Austria. Pop. including Herzegovina about 1,600,000.

Bosporus, or **Bosphorus** (that is, "Oxford"), the strait, 18 miles long, joining the Black Sea with the Sea of Marmora, called also the Strait of Constantinople. It is defended by a series of strong forts, and by agreement of the European powers no ship of war belonging to any nation shall pass the strait without the permission of Turkey. The shores of the Bosporus are elevated and the scenery picturesque. Over this channel (about 3,033 feet wide) Darius constructed a bridge of boats, on his expedition against the Scythians. The Cimmerian Bosporus was the name given by the ancients to the strait that leads from the Black Sea into the Sea of Azov, now the strait of Kaffa or Yenikale, the other Bosporus being distinguished as the Thracian Bosporus. There was anciently a Greek kingdom of the name of Bosporus, so called from the Cimmerian Bosporus, on both sides of which it was situated. The capital of this kingdom was Panticapæum (represented by the modern Kertch), in the Tauric Chersonese, the ancient name of the Crimea. This kingdom was founded about 480 B.C. Spartacus was among the first kings. Under a successor, Satyrus, the kingdom was extended to the coast of Asia, and his son Leucon farther extended it. He improved the commerce of the country (in particular by the exportation of corn to Athens, also of fish, fur, skins, bees'-wax, and slaves). From him his descendants were called Leuconidæ. Leucon became tributary to the Scythians 200 B.C., and the tribute was finally so oppressive that Parisades, the last of the Leuconidæ, preferred to submit to Mithridates king of Pontus, who vanquished the Scythians under Scilurus 116 B.C., and made his son king of Bosporus. At the death of Mithridates the Romans gave the country, 64 B.C., to his second son, Pharnaces, who was afterward murdered. The Romans placed different princes successively upon the throne, who all pretended to be descendants of Mithridates. When this family became extinct, 259 A.D., the Sarmatians took possession of the kingdom, from whom it was taken by the Chersonesians in 344. The Tauric Chersonese then belonged to the Eastern Empire, till it was seized by the Chazars, and afterward by the Tartars, under the Mongol princes.

Bosquet, **bos-kâ**, **Pierre François**, French soldier: b. Mont de Marsen, France, 8 Nov. 1810; d. Toulouse, 5 Feb. 1861. In 1829 he entered the Polytechnic School, and, in 1833, became a sub-lieutenant in the artillery. In 1835, he went with his regiment to Algeria, where he began to distinguish himself. Be-

tween 1836 and 1848 he had passed through the successive ranks of captain, chef-de-bataillon, lieutenant-colonel, and colonel, when, in that year, he was appointed by the Republican government general of brigade. In 1854 the Emperor Napoleon III. raised him to the rank of general of division, and enrolled him in the staff of the army of Marshal St. Arnaud. He was with the French army in the Crimea, where he greatly distinguished himself, and was wounded in the assault on the Malakoff Tower at the siege of Sebastopol. In 1856, he was made a marshal of France, and a senator. In 1859, he was appointed to a command in the war against Austria.

Boss, **Lewis**, American astronomer: b. Providence, R. I., 26 Oct. 1846. He was graduated at Dartmouth College, in 1870; astronomer of the Northern Boundary Survey for the determination of the line between the western part of the United States and British America; and, since the completion of that work, director of the Dudley Observatory, Albany, N. Y. He was chief of the United States party sent to Chile in 1882 to observe the transit of Venus; was elected a member of the National Academy of Science, in 1889, and an honorary foreign associate of the Royal Astronomical Society, in 1890. He is best known for his work upon star declinations, undertaken in connection with his work on the boundary survey, which is the most complete investigation of the kind ever executed, and for his 'Catalogue of 8,241 Stars' — which was a part of the 'Co-operative Catalogue' prepared by leading astronomers of Europe.

Boss, a master or overseer, a term often applied to the superintendent of a gang of workmen. In American politics, the term came into use, after the exposure of the Tweed Ring, to designate the leader of a political organization who retains his power by unscrupulous methods and the use of public offices as rewards for his supporters.

Boss, in Gothic architecture the protuberance in a vaulted ceiling formed by the junction of the ends of several ribs, and serving to bind them together; usually elaborately carved and ornamented.

Bosse, **bös**, **Abraham**, French engraver and etcher; b. Tours, 1605(?) ; d. there, 1678. He lived most of his life in Paris and was professor in the Royal Academy of Painting there. He prepared about 800 plates representing festivals and various scenes in the life of the people. He wrote also 'Traité des Manières de Graver en Taille Douce sur l'Airain par l'Eau Forte et les Vernis Durs et Mols.'

Bosse, **bös-sè**, **Robert**, German statesman: b. Quedlinburg, 1832. He studied law at Heidelberg, Halle, and Berlin, held different offices in Prussia, and in 1876 he entered the Prussian ministry. In October 1889 he became under-secretary of state in the imperial Department of the Interior, and in this capacity had an important part in framing the laws for the insurance of workmen, and in defending them in the Reichstag. In 1891 he became secretary in the Department of Justice, and was president of the commission to frame the new Civil Code. In 1892 he again entered the Prussian ministry as minister of education. He was

editor of the 'Monatsschrift für Deutsche Beamte'; and he wrote 'Commentary on the Laws of 1889 for the Insurance of Invalids and the Aged'; 'An Official Journey to the Orient' (1900) and several articles in sociological and legal periodicals.

Bossi, Enrico Marco, ěn-rĕ'ko mār-kō bōs-sĕ, Italian composer: b. Salò, 1861. He was educated at the Milan Conservatory, was organist in the Como cathedral and instructor in organ-playing at the Naples Conservatory. His musical compositions include an organ concerto, 'Il Cieco,' an opera, and 'Canticum Cantorum,' a sacred cantata. He has written (with Tebaldini) 'Method of Study for the Modern Organ.'

Bossi, Giuseppe Carlo Aurelio, Italian politician and poet: b. Turin, 15 Nov. 1758; d. Paris, 20 Jan. 1823. When only 18 years old he made a successful debut as a dramatist. In 1792 he was sent on a diplomatic mission to Berlin, and a few months later to St. Petersburg. In 1796 King Charles Emanuel IV. appointed him his agent near Gen. Bonaparte. He acted a somewhat conspicuous part in the various changes imposed upon the Sardinian states by the directory and the consular government of France; and finally was, with Carlo Giulio and Carlo Botta, a member of the triumvirate which governed Piedmont previous to its annexation in 1802. Some two years later he entered the French civil service, and was appointed prefect of Ain. In 1810 he was made a baron of the empire, and promoted to the prefecture of Manche, which post he kept on the first restoration; but having, in March 1815, adhered to Napoleon, he was dismissed on the second return of the Bourbons. He wrote some lyrical poems, and also 'L'Indipendenza Americana,' 'La Olanda pacificata,' in two cantos, and 'Oromasia,' in 12 cantos, giving a description of the principal events in the French revolution.

Bossuet, Jacques Bénigne, Bishop of Meaux: b. Dijon, 27 Sept. 1627; d. 16 April 1704. While attending the Jesuit College at Dijon he got possession of a Latin Bible, which made an indelible impression upon him. At the age of 15 he was sent to Paris, where he entered the College of Navarre, the president of which, Nicholas Cornet, took pleasure in forming his mind. Bossuet, under the direction of this worthy teacher, studied Greek and the Holy Scriptures, read the ancient classics, and investigated the Cartesian philosophy. He was made Doctor of the Sorbonne and canon in Metz. Here he edified his hearers by his preaching and example; was commissioned by his bishop to refute the catechism of the Protestant minister Paul Ferry, and did it in such a way that even his antagonists were obliged to respect him. The queen-mother (Anne of Austria) was induced, by this work, to employ Bossuet in the conversion of the Protestants in the diocese of Metz. This business often called him to Paris, where his sermons met with great approbation. The sermon which he delivered in 1668, on the occasion of Marshal Turenne's joining the Roman Church, procured him the bishopric of Condom. In 1670 the king charged him with the education of the dauphin. In consequence of this appointment he resigned his bishopric in 1671, because he thought it inconsistent with his duty to retain it during a

continual absence from his diocese. At this time he delivered his sermon at the funeral of Madame the Duchess of Orleans—a princess who, in the midst of a brilliant court, of which she was the ornament, died suddenly in the bloom of youth. His last sermon of this kind (that at the tomb of the great Condé) is considered as a masterpiece. The manly vigor which characterized his orations is seen also in the 'Discours sur l'Histoire Universelle,' designed for the instruction of his royal pupil. The care which he took of the education of this prince was rewarded in 1680 by the office of the first almoner of the dauphin; in 1681 by the bishopric of Meaux; in 1697 he obtained the dignity of a councillor of state, and a year afterward that of the first almoner of the Duchess of Burgundy. His practice and his doctrine were equally severe. All his time was divided between his studies and the execution of his official duties; he seldom allowed himself any recreation. The learned Benedictines of the Brotherhood of St. Maur published a complete edition of the works of Bossuet in 43 volumes 8vo (Versailles 1815-19). Bossuet was unrivaled as a pulpit orator, and greatly distinguished for his strength and acumen as a controversialist. Among the most celebrated of his works are his 'Oraisons Funébres'; 'Histoire des Variations des Eglises Protestantes'; 'Politique tirée des propres Paroles de l'Ecriture Sainte.' The French Academy consider him among their most renowned members. He has described his own life at length. For his dispute with the archbishop of Cambrai, Fénelon, see FÉNELON and QUIETISM.

Bossut, Charles, French mathematician: b. Tartaras, in the department of the Rhône, 11 Aug. 1730; d. 14 Jan. 1814. He was educated at the Jesuit College, Lyons, and having met with the 'Eloges of Fontenelle,' was smitten with so eager a desire to imitate the distinguished individuals therein described, that he wrote to Fontenelle himself on the subject. That veteran, now 90 years of age, not only answered the letter, but expressed such an interest in the future progress of his young correspondent, that Bossut repaired to Paris, and was introduced by Fontenelle to Clairaut and D'Alembert, the latter of whom he appears to have particularly admired and studied to imitate. In 1752 he was appointed professor of mathematics to the school of Mézières, and held that office for 16 years, during which he gained several prizes offered by the Academy of Sciences. He was afterward admitted a member of that body, and was at the same time appointed examiner of candidates for the artillery and engineers. At the Revolution he was deprived of all his appointments, and afterward lived in retirement till his death. His most important works are a 'Course of Mathematics,' which was long in repute as a textbook; a 'Treatise on Hydrodynamics'; the 'Introductory Discourse to Mathematics,' and various other articles in the Encyclopédie; and a 'History of Mathematics.' He also edited the works of Pascal.

Bostanji, a class of men in Turkey, numbering about 600, originally the Sultan's gardeners, but now also employed in several ways about his person, as mounting guard at the seraglio, rowing his barge, etc., and likewise in attending the officers of the royal household.

BOSTON

Boston, England, a municipal and parliamentary borough and port of Lincolnshire, situated on the river Witham, about five miles from the sea, 32 southeast from Lincoln. It derived its name (a corruption of Botolph's town) from St. Botolph, who founded a monastery here about the year 650. Its chief interest for Americans lies in the fact that it was the English home of the most influential of the settlers of Boston, Mass. The port had formerly a flourishing trade, but owing to various causes, and especially the fact that in dry seasons the river became choked up with sand brought in by the tides, this trade greatly declined. In 1881 a new channel was constructed so as to bring the town within three miles of the sea by navigable water; and a new dock of seven acres area, capable of admitting vessels of 3,500 tons at the highest tides, was opened three years later. Boston contains some fine buildings, notably the parish church of St. Botolph, the Cotton chapel, and various other places of worship, a grammar-school dating from 1554, the Athenæum, the Guildhall, and the Assembly rooms, under which are arranged the butter-market, poultry-market, and the police-station. St. Botolph's Church is a very large and handsome Gothic structure, with a tower, known as Boston Stump, 282 feet high, containing a carillon of 36 bells cast at Louvain. In the upper part of the tower, octagonal in shape, lights used to be suspended for the guidance of mariners at sea and travelers crossing the fens by night. The town is now well supplied with water brought from a reservoir distant about 14 miles. The leading industries comprise iron and brass foundries, the manufacture of farm implements, sails, ropes, and bricks, and tanning, brewing, and malting. Fishing also gives occupation to many of the inhabitants, and there is steam communication with Hamburg, Hull, and London. Pop. about 17,000.

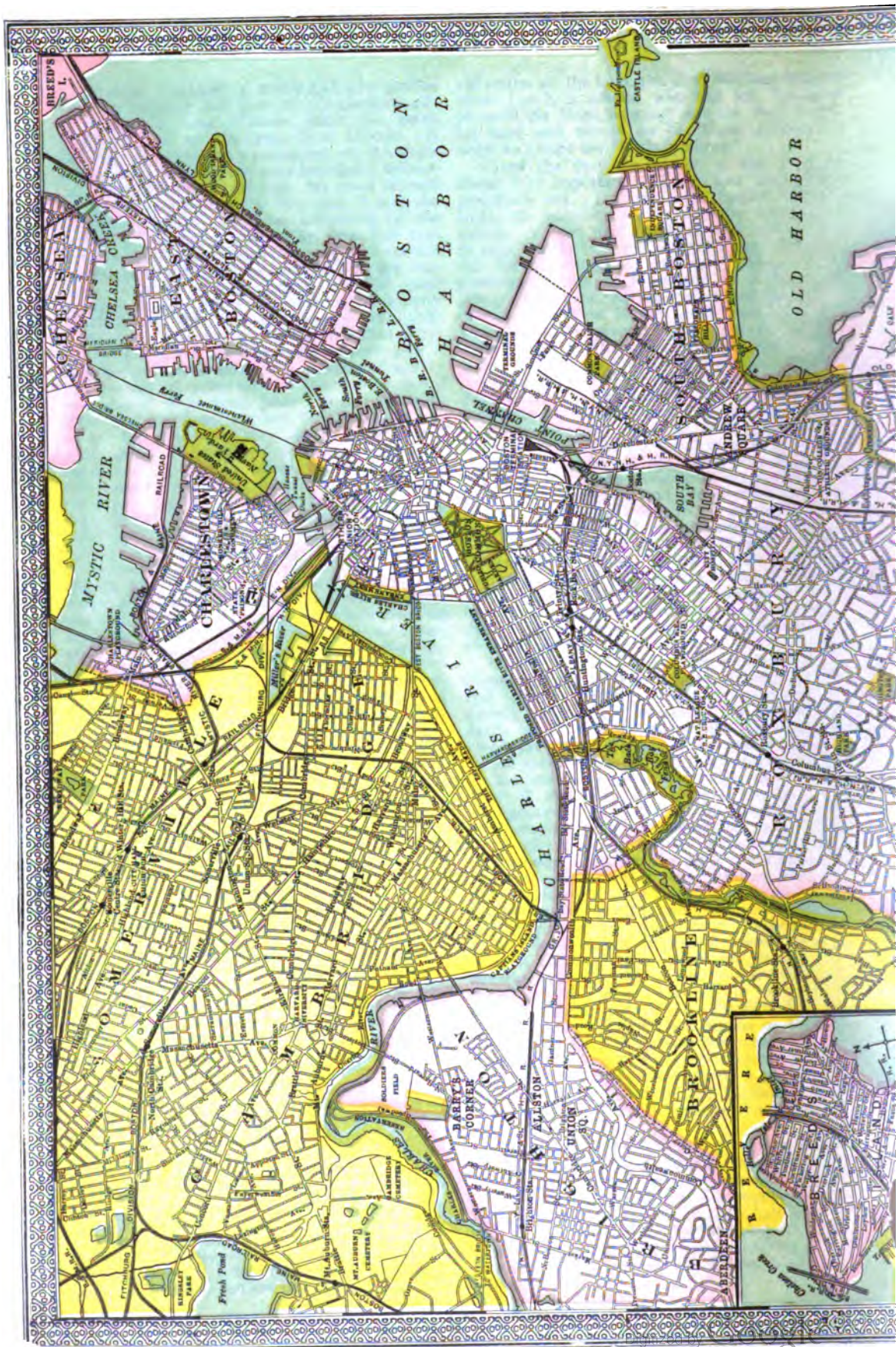
Boston, Mass., the capital of the State, and, according to the United States census of 1910, fifth city in population in the United States. It is situated on the western shore of Massachusetts Bay. The settlement from which it has grown was made in 1630 by members of the Massachusetts Bay Company, bearing with them the charter granted to this organization by Charles I. The leader of the first expedition of settlers who landed at Charlestown, 17 June 1630, was Gov. John Winthrop, a Puritan gentleman. In his fleet came others of like condition, Sir Richard Saltonstall, Isaac Johnson and his wife, the Lady Arbella, daughter of the Earl of Lincoln, together with a company of sturdy Puritans, chiefly from Lincolnshire. They landed 700 or 800 strong, a number soon increased to 1,000 and then to 2,000 by later arrivals—the most considerable settlement on the American coast. At the end of the first summer, a season of hardship, they moved across the Charles River to the promontory of Shawmut—an Indian word translated "living fountains." This headland, with ample water-supply, was called by the English settlers Trimountain, from the three-peaked hill, now Beacon Hill, which formed its highest eminence. On 17 Sept. 1630 it was voted to change its name to Boston, after the Lincolnshire town from which some of the chief settlers had come. The origi-

nal settler of the land, the Rev. William Blackstone (q.v.), a scholar who had left England to avoid the "lord-bishops," sold the newcomers his land and moved on to Rhode Island, in order to escape the "lords-brethren."

From the first the power of the Puritan clergy was important. Church and State were practically one. Trained in the English universities, the ministers set a true value upon education. A free public school was established in 1633, and in 1636 the General Court provided for the beginnings of Harvard College. The government both of town and of colony was purely democratic, having for its unit the town-meeting, which in Boston itself maintained its sway, with the single interruption of British military rule at the outbreak of the Revolution, until the town became a city in 1822. Besides the training in self-government thus acquired, Boston had the advantage of virtual independence through its early years. At first the Crown was fully occupied with its own problems in England; and when Cromwell came into power, so strongly Puritan a settlement was naturally left much to its own devices. Thus the charter of the Bay Company, and the liberties enjoyed under it, became very dear to the people of Boston. When Charles II. came to the throne there were grave fears that these liberties would be seriously curtailed. In 1664 four royal commissioners came from England to adjust difficulties in several colonies. Their mission to Boston was a failure, and for some years to come the town was secure under its original system of government.

Under James II. came the dreaded change. Complaints of the Boston spirit of independence and religious intolerance were borne more frequently to the English court, and before the death of Charles II. the Court of Chancery voted the Massachusetts Bay charter vacated. In the summer of 1686 the original government of the colony came to an end. Before the close of this year, Sir Edmund Andros, the new governor appointed by the king, the first chief magistrate in Massachusetts not chosen by popular election, arrived in Boston. Probably nobody in his peculiar place could have satisfied the people at this time. Within less than three years from his arrival a bloodless revolution in Boston, a well-organized uprising of the people, removed him from office. Early in 1690 he was sent back to England, where Increase Mather, the leading minister of Boston, had already been for nearly two years, trying to have the old charter restored, or to get the best possible substitute for it. This he succeeded in doing, after the accession of William and Mary, and had the further satisfaction of choosing the first governor under the new instrument making Massachusetts a royal province. With this governor, Sir William Phipps, Mather returned to Boston in the spring of 1692.

By this time Boston had grown to importance as the leading seaport, and in many respects the foremost town in America. Before the end of the 17th century its population was approximately 7,000. In another half century this number was more than doubled. A good idea of certain aspects of the town in this period is given by an Englishman, Daniel Neal, who wrote in 1719:



DORCHESTER

BAY

SQUATUM

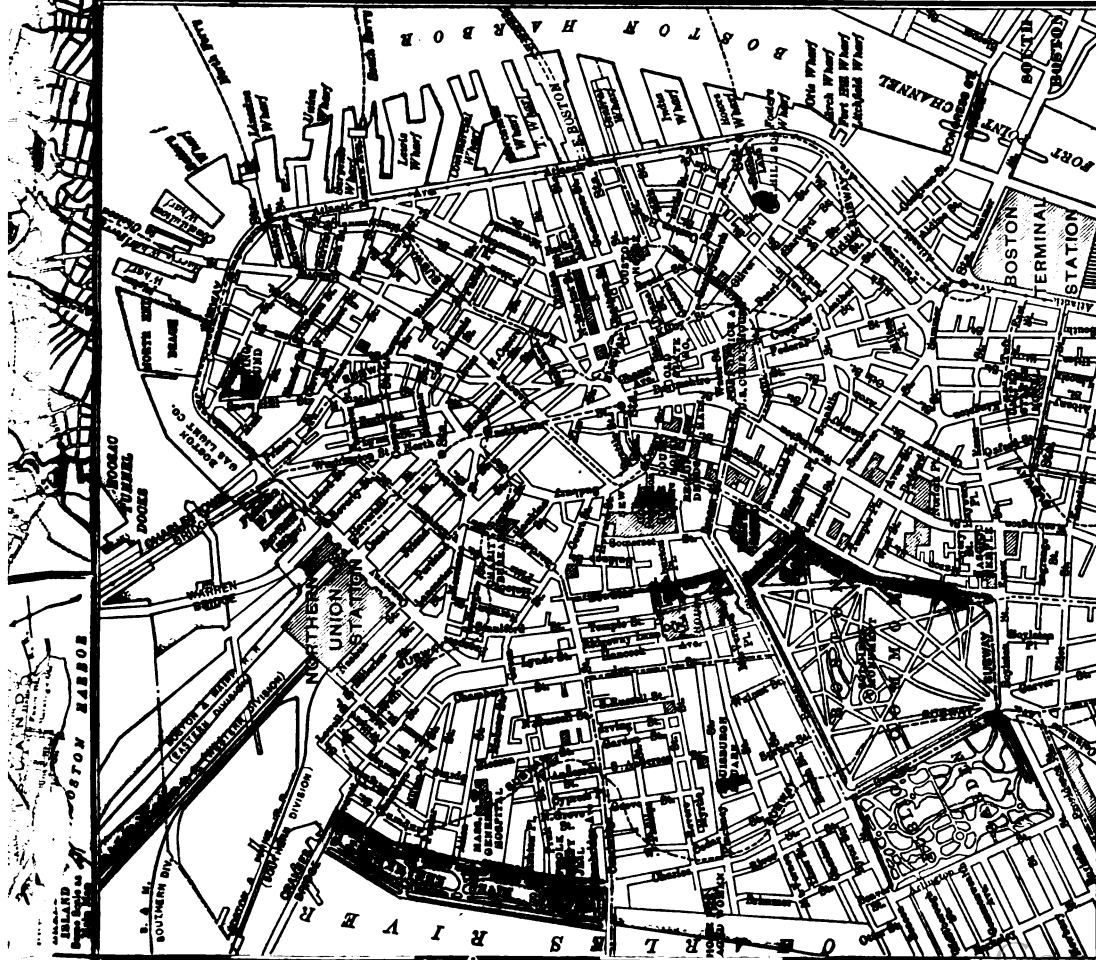
QUINCY

MILTON

MAP OF BOSTON AND VICINITY.

Scale 4,375 feet=1 inch

BUSINESS PORTION OF BOSTON ON ENLARGED SCALE



BOSTON

"The bay of Boston is spacious enough to contain in a manner the navy of England. The masts of ships here, and at proper seasons of the year, make a kind of wood of trees like that we see upon the river of Thames about Wapping and Limehouse, which may easily be imagined when we consider that by computation given into the collectors of his Majesty's customs to the governor upon the building of the light-house, it appeared that there was 24,000 ton of shipping cleared annually.

At the bottom of the bay is a noble pier 1,800 or 2,000 foot long, with a row of warehouses on the north side for the use of merchants. The pier runs so far into the bay that ships of the greatest burthen may unlade without the help of boats or lighters. From the head of the pier you go up the chief street of the town [now State Street], at the upper end of which is the town house or Exchange, a fine piece of building, containing, besides the walk for the merchants, the Council-Chamber, the House of Commons, and another spacious room for the sessions of the courts of justice. The Exchange is surrounded by booksellers' shops, which have a good trade. There are five printing presses in Boston, which are generally full of work, by which it appears that humanity and the knowledge of letters flourish more here than in all the other English Plantations put together; for in the city of New York there is but one bookseller's shop, and in the Plantations of Virginia, Maryland, Carolina, Barbadoes, and the Islands, none at all."

As in the 17th so in the 18th century, the clergy and ecclesiastical affairs loomed large upon the local horizon. The prominence in Boston records of what is known as the "Mather dynasty" — of which Increase and his son, Cotton Mather, were the chief figures — bears witness to this condition. The younger of these Puritan priests is remembered largely for his connection with the witchcraft delusion, which had its worst effects in Salem, but in temporal matters and humanitarian work he impressed himself no less forcibly on the life of his time. Of the devout laity, educated at Harvard College, giving themselves to public service, living private lives of dignity and piety, Samuel Sewall, whose diary preserves the true flavor of ancient Boston, stands as an admirable type. In contrast with the background of lives like his, the society of which royal governors were the central figures presents a less austere picture. About the governors, established from 1716 onward in a sort of vice-regal state in the Province House, gathered the more worldly element of the place — prosperous merchants, officials of the Crown, members of the King's Chapel congregation and the two other Anglican churches established before the middle of the century. Under the Province charter religious liberty was increasing, and churches of various denominations — including even the Quakers, whose first representatives in Boston were hanged on the Common — had come into being. Meanwhile the constant friction between the governors and the General Court, always meeting in Boston, kept the spirit of political independence wide awake. A fruitful source of trouble was the annual grant voted by the court to the governor. A salary the people steadily refused to pay to an official not of their own choice; and the amount of the grant varied according to the personal popularity of the chief magistrate. Through all these years, moreover, the town-meeting was educating the people in self-rule, so that when the time was ripe for active opposition from American colonists to the colonial government of England, the men of Boston were ready to take a leading part in the struggle.

In 1761 James Otis, advocate-general of the province, resigned his position under the Crown in order to contest the Writs of Assistance,

which permitted customs officials to enter any house, search for smuggled goods, and on suspicion seize what they might find. The argument against these writs was the first of many conspicuous acts of resistance to royal authority. In 1765 the Stamp Act, taxing many articles of daily use in the colonies, was passed by Parliament. Its principle was bitterly resented in Boston, where riotous outbreaks soon took place. A mob completely destroyed the house of Thomas Hutchinson, chief justice of the Province, and was properly denounced by respectable citizens. In the next year the repeal of the act was joyfully celebrated by all classes. In 1770 occurred the "Boston Massacre" (q.v.), the result of friction between the inhabitants and the British troops stationed in the town. In the use of "a word which historians apply to such events as Cawnpore or the Sicilian Vespers" — the word "massacre" to describe "the careless shooting of half a dozen townsmen" — John Fiske finds "all the mildness of New England civilization brought most strikingly before us."

The town-meeting was even more typical of this civilization, and from its training Samuel Adams, at about this time, stepped into virtual leadership of the revolutionary cause in Boston. The Committee of Correspondence was formed upon his motion, and out of it grew by degrees the union not only of towns, but of colonies, in their opposition to the throne. On 16 Dec. 1773, occurred the "Tea Party," a cleverly planned and executed plot for throwing into Boston harbor, by men disguised as Mohawk Indians, the cargoes of three vessels bearing tea upon which the people of Boston would not pay the hated tax. Parliament retaliated by passing the Boston Port Bill, which closed the harbor and brought the chief industry of the town, its maritime trade, to a standstill. A military governor, Gen. Gage, took the place of Hutchinson, who had been acting as the chief civil magistrate, and open hostilities were at hand.

The events of 19 April 1775 — the warning ride of Paul Revere, the escape of John Hancock and Samuel Adams, the fights at Concord, Lexington, and along the road between the two towns — are the commonplaces of American history. They belong to Boston in so far as the Boston revolutionary leaders were concerned in them, and as the British troops set forth from the town and returned to it defeated. The battle of Bunker Hill in Charlestown, 17 June 1775, bears much the same relation to Boston history. On 3 July Washington arrived in Cambridge and took command of the American army, which from that time until the following March kept the British closely within the lines of the siege of Boston. Many of the inhabitants were permitted early to depart. Those who remained suffered hardships and privations, besides witnessing the destruction of much American property, and such scenes of desecration as the use of the Old South meeting-house as a riding-school. On the night of 4 March 1776 Washington made his memorable seizure of Dorchester Heights (now South Boston), and on the 17th Howe with all his army and a large following of American Tories sailed for Halifax. Thereupon Washington entered the city, and even before the signing of the Declaration of Independence Boston ceased to be a scene of active warfare in the long conflict. Yet John Adams, Hancock, and other Boston men bore

BOSTON

an important part in the counsels of the young nation, in whose army and navy the town was fully represented.

The recovery from the effects of the siege was slow. To take the place of the departed Tories, and to occupy their spacious houses, there was in the remaining years of the 18th century a gradual immigration from the neighboring country (where Tories were few) of families possessing wealth, energy, and qualities of leadership. Local government by town-meeting was resumed. In 1780 a State government for Massachusetts was formed, and John Hancock was chosen the first governor. In the general readjustment maritime affairs took their previous place of importance. Cut off by British legislation from the West India trade, the Boston merchants looked farther abroad. The prospects of the fur trade on the northwest coast of America became known through Capt. Cook's journals, published in 1784. In 1787 two small vessels, the *Columbia* and the *Washington*, sailed from Boston to attempt this trade. Before her return in 1790 the *Columbia* had circumnavigated the globe—first of American vessels to accomplish this feat. The furs collected in the Northwest had been sold in China, and the example thus set led the way to an important trade with the East in which Boston long maintained the American supremacy. In such a seaport as Boston, Jefferson's Embargo and the War of 1812 were naturally unpopular. The Federalist party, moreover, had much of its best strength in Boston. The powerful mercantile class saw its best interests in a strongly centralized government and conditions of general stability. The opinions of this class colored the influential feeling of the community to an extent which laid Boston open to charges of something very near disloyalty to the national government. The crippling of commerce, however, had the good effect of turning capital and energy toward manufacturing. In 1814 Francis C. Lowell, of Boston, made the first American use of the power-loom in his mill at Waltham at almost the same time with its introduction into England. The growth of the great cotton industry at Lowell followed rapidly upon this invention. With the spread of manufactures Boston itself was growing. In 1820 its population was over 43,000. The old form of town government had become unwieldy. For some years efforts had been making toward the adoption of a city charter. In 1822 this was finally achieved.

From the time of this change in local government to the present, the outward growth of the city, as figures can speak for it, has been unbroken. In matters not computed in this way, the development has been in several important respects unique. With Boston, for example, the Unitarian movement in America is especially associated. Before the town became a city there were divisions among the clergy of Congregationalism—practically the established order in New England—on various doctrinal points, notably that of the Trinity. Under the leadership of William Ellery Channing the "liberal" clergy and most of the older and more influential religious societies turned from Calvinism to the new theology. Especially between 1820 and 1830, an acute controversy took place. Between 1840 and 1850 the Unitarian body itself was disturbed by differences between the more conservative

element and the radicals, of whom Theodore Parker was a type. The result of the successive controversies has been a liberalizing of religious beliefs not only in what came to be Unitarian Boston, but in the many Protestant bodies which now acknowledge an important debt to Unitarianism. Another far-reaching movement which had its headquarters in Boston was that of anti-slavery. Here in 1831 William Lloyd Garrison established his journal, the *Liberator*. A year later the first anti-slavery society in America was established in Boston. The agitation of the Abolitionists was for a long time opposed by the conservative class, which resorted even to mob violence in the hope of suppressing the reformers. But to Garrison and his associates it was due, as Mr. J. F. Rhodes has said, "that slavery became a topic of discussion at every northern fireside." When the Civil War broke out, the cause of the union, perhaps even more than that of abolition, enlisted the enthusiastic support of the Boston community; yet, as if in fulfilment of the work which Garrison began, it was from Boston that Gov. Andrew sent forth the first regiment of colored troops raised in the North.

With Boston and its immediate vicinity, moreover, are associated the names which stand for the most important contribution of the 19th century to American literature. Prescott, Ticknor, Bancroft, Motley, and Parkman; Emerson, Hawthorne, Lowell, Longfellow, Holmes, and Whittier,—these and their associates, bound together by many ties of sympathy and friendship, constituted a group of writers which gave the place a unique distinction in letters. The '*Atlantic Monthly*,' founded in 1857, became the vehicle for much of their most characteristic utterance. The influences of Transcendentalism (largely a local movement, culminating in the forties), of anti-slavery feeling, of creative expression, combined to give to this utterance as a whole something of the distinction which the individual writers won each for himself.

During the 19th century two important changes in the Boston landscape affected the future of the city, in the regions both of residence and of business. The first of these was the filling in of the Back Bay, an arm of the Charles River which spread between the Common and the hills of Brookline, running south and east as far as the Neck or narrow strip of land connecting Boston and Roxbury. From the early years of the century changes in the shore line of Boston had been wrought by cutting down the principal hills and filling out the irregularities of the harbor front. The first step in the series of events which led to the conversion of the Back Bay from water into land was the granting of a charter in 1814 to the Roxbury Mill Corporation, permitting the building of dams across the Back Bay and confining its water for mill purposes. To these rights the Boston Water Power Company succeeded in 1832. At about the same time the Boston & Providence and Boston and Worcester railroads invaded the Back Bay with their bridges. Moreover the waters became unsanitary through drainage, and to solve the entire problem, hygienic and legal, a State commission was appointed, and made a full report in 1852. Its recommendations to create the whole tract of land now known as the Back Bay did not at once satisfy the various conflicting interests,



COPLEY SQUARE, BOSTON.



MUSEUM OF FINE ARTS. BOSTON.

BOSTON

but in 1858 the actual work of filling up the waters was begun. The result was a large enrichment of the State treasury, and the addition to the city of the whole district occupied by the residences, clubs, churches, hotels, and other institutions connected with the most prosperous life of the city. The original peninsula of Boston contained 783 acres. Through its encroachments upon water, largely in the Back Bay, it has grown to 1,829 acres. With the accessions of outlying districts, the total area of the city is now 23,707 acres.

The second great change in the outward aspect of Boston resulted from the great fire of 9 and 10 Nov. 1872. From the beginning of its history Boston had been afflicted by serious fires. This greatest of them all destroyed 776 buildings, all but 67 of which were of brick and stone. It devastated Summer Street (both sides), Washington Street from Summer to Milk, Milk Street to the post-office, Devonshire Street, Water (both sides), Congress, Lindall and Oliver streets to the harbor. From the corner of Washington and Franklin streets the shipping at the wharves was in clear view. Nearly 2,000,000 feet of land were burned over. The total loss was estimated at more than \$75,000,000. Yet by private enterprise and State aid the recovery was immediate. The opportunity to widen and straighten streets in the business district was seized. Stalier buildings rose in the place of those destroyed, and a new business region, corresponding to the new district of residences, was created.

The census of 1910 gave the population of Boston as 670,585. The metropolitan district, including the 38 cities and towns of which Boston is the centre, has by the same census a population of 1,423,429. The territory within 50 miles of Boston has 3,000,000 inhabitants—a population second in America only to that in the corresponding area about New York. The assessed valuation of all taxable property in Boston itself is \$1,315,709,757—a figure surpassed in the United States only by the corresponding figures for New York and Philadelphia.

In 1910 the vessels engaged in foreign trade which entered the port of Boston had a tonnage of 2,799,672; and those which cleared, 4,659,751. The tonnage of vessels in the coasting trade, and entering the port of Boston during the same year, was about 10,500,000.

The total number of immigrants from trans-Atlantic ports admitted at the port of Boston in 1910 was 54,676 (steerage).

In 1910 the public school teachers of Boston numbered 2,844; and the total enrollment of pupils in that year was 101,000. Independent industrial schools are a strong factor.

The park system of Boston is under the joint control of the Metropolitan Park Commission (appointed by the governor of Massachusetts) and the Board of Park Commissioners (appointed by the mayor of Boston). These commissioners serve without pay. In the Metropolitan system are included the Blue Hills Reservation (4,232 acres), the Middlesex Fells and Mystic Lakes (3,002 acres) and smaller reservations, including 66 acres at Revere Beach, where the State bath-house of 1,000 rooms provides the best facilities for sea-bathing. To the Board of Park Commissioners falls the management of the Marine Park at South Bos-

ton, Franklin Park at West Roxbury, Arnold Arboretum at Forest Hills, boulevards, fens, playgrounds, and open-air gymnasia. The Common (48¾ acres) and the adjoining Public Garden (24¼ acres), both in the heart of the city, are in charge of the Public Ground Department of the city of Boston. The State commission acts in consultation with local boards, including that of Boston, and serves the people of 12 cities and 25 towns within a radius of 25 miles from the State House. The general park system thus provided is remarkable for its beauty, accessibility, and actual benefit to the community. The work of the city bath department is a characteristic example of municipal service to the people. The five trustees of this department maintain seven beach baths, one river bath, two swimming-pools, nine floating baths, five gymnasia, and the Dover Street bath-house, a model building with free baths for men and women throughout the year. Metropolitan commissions of water and sewerage corresponding to the Park Commission, serve the city and surrounding towns. The water-supply is drawn from lakes and rivers in eastern Massachusetts,—the Sudbury River, Mystic Lake, Lake Cochituate, and watersheds of wide area. A city water department does its separate work in connection with the Metropolitan Commission.

The churches of Boston, according to the 'City Directory' of 1902, were 399 in number. Of these 50 are Roman Catholic (including Polish, German, Italian, French, Portuguese, and Syrian parishes), 38 are Baptist, 37 Congregational-Trinitarian, 34 Methodist-Episcopal, 32 Protestant Episcopal, 25 Congregational-Unitarian, 13 Lutheran, and 10 Universalist, with others in smaller numbers. The First Church of Christ (Scientist) is the "mother church" of "Christian Science" throughout the country and the world. Charitable organizations, both municipal and private, abound, and enlist the unpaid services of a large class in the community. An admirable organization of Associated Charities gives direction to the proper sources or seeks to obtain therefrom for the sick and needy adequate and suitable relief. The principal hospitals are the Boston City Hospital, a city institution, the Massachusetts General, supported by private endowment, the Carney, in charge of Roman Catholic Sisters of Charity, and the Massachusetts Homœopathic. These are open to persons of all races and creeds. In the Massachusetts General Hospital in 1846 the properties of ether as an anæsthetic were first demonstrated. From the discovery then made the progress of modern surgery took its first great step. There are, besides the institutions mentioned, many smaller hospitals for special classes, children, women, etc. The provisions for industrial training and the education of defectives are ample. The Perkins Institution and Massachusetts School for the Blind (incorporated 1829) typifies the good work they have done and are doing. Here Dr. Samuel G. Howe did his memorable pioneer work in the case of Laura Bridgman.

As a centre of higher education in many branches Boston attracts and maintains a large population of students. The Public Library, housed in one of the most beautiful buildings in the country, and distributing its more than 800,000 volumes through 10 branch libraries and 21 delivery stations throughout the city, puts the

BOSTON CASE—BOSTON MASSACRE

materials of scholarship within the reach of all. Harvard University is close at hand. Its Medical School is in Boston itself. Here also are the Massachusetts Institute of Technology, Boston University, the Boston Museum of Fine Arts, with its School of Drawing and Painting, and the New England Conservatory of Music, supplemented by the concerts of the Boston Symphony Orchestra. The courses of free lectures provided by the Lowell Institute, established in 1838, with an original endowment of \$237,000, have made a constant contribution to the cause of general education. If the suggestion to co-ordinate these and the many other educational institutions of Boston into a general university is ever carried out, the place may well become one of the foremost centres of organized learning in the world.

In 1894 the Union Station at the North End of the city brought together the terminal facilities of all the railroads connecting Boston with northern New England, with Canada, and, through Fitchburg, with the West. On 1 Jan. 1899 the first train entered the South Station, the largest railway terminal in the world. Here the railroads connecting Boston with southern New England, New York, the South, and the West, by way of Albany, meet under one roof. The North and South Stations are connected both by surface and by elevated electric cars—a part of the system of the Boston Elevated Railway. This company has succeeded to the rights of the several street railways formerly holding franchises, and by surface cars, elevated lines, and subways, upon which the underground systems of other cities have been modeled, gives the city, with the attractive and accessible suburbs for which Boston has always been noted, a rapid-transit service of unusual comfort and effectiveness. The subway system will be still further extended, first of all by the completion of the tunnel now building under the harbor to connect Boston and East Boston.

In the Rivers and Harbors Bill passed by the United States Congress in June 1902 an appropriation of \$3,600,000 was made for the improvement of Boston Harbor. Its expenditure in making a broader and deeper channel from Charlestown and Chelsea bridges to the sea is expected to forward the progress made in recent years by Boston as a seaport. Its ample harbor, well protected from the sea by islands, has always played an important part in the life of Boston. The total foreign trade passing through the port of Boston during 1910 was \$226,339,379, as against \$235,718,231 in 1909, placing her among foremost American cities. A number of transatlantic steamship lines run from Boston. The coastwise commerce of the port is valued, in merchandise, in sums ranging annually between \$85,000,000 and \$131,000,000. As a wool market Boston stands second in the world only to London. In the single week of 1901, in which Boston made its greatest record in the sales of wool, it sold more than the total clip of any State in the Union, excepting Montana and Idaho, for that year. In the business of shoes, leather, and hides, Boston is the chief distributing centre of the United States. The trade in salt and fresh fish—as befits the capital of the State with a cod for its emblem—is larger than in any other city of the country. The cotton industry of Massachusetts looks to Boston for much of its capital

and control. Miscellaneous trades and manufactures, added to the branches of business enumerated, give Boston a high place among the commercial and industrial cities of the country.

In the growth from an ancient to a modern city many historic buildings have inevitably disappeared. But Boston is fortunate in a few of those that remain. Chief among these are Christ Church (1723), the Old South Meeting-house (1729), Faneuil Hall (1742, enlarged in 1806), the Old State House (1748), King's Chapel (1749, built around the previous wooden church erected in 1688), the front portion of the present State House (1795-8), and Park Street Church (1809).

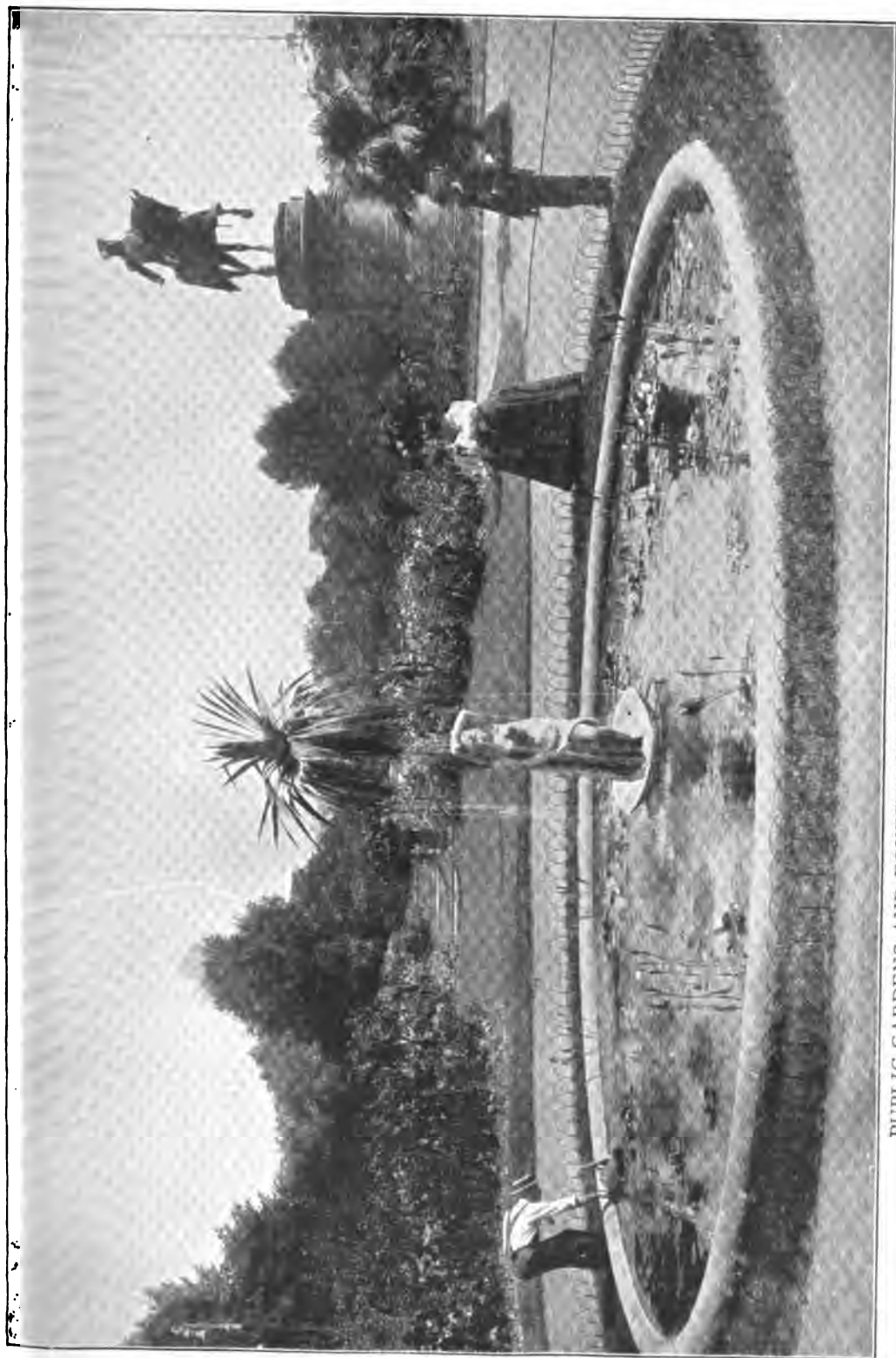
In 1907 Mayor Fitzgerald, suspecting mismanagement in municipal affairs, created a commission to investigate and report to the legislature which legalized its activities. Gross mismanagement was the substance of the Commission's report. Every department came in for its share of censure. The Commission concluded that the entire system of municipal government, including its electoral machinery, was altogether to blame; that successful municipal government through popular suffrage was absolutely impossible under the present system. This made radical changes necessary, and on 2 Nov. 1909 a charter was adopted, known as plan No. 2, calculated to improve municipal government. Among the more important provisions of the new charter are: (1) lengthening of the Mayor's term in office to four years, with possible recall at the end of two; (2) providing for nominations by petition of not less than 5,000 voters; (3) creating a city council of nine members, at salaries of \$1,500 a year; and (4) making it a criminal offense for a member of the city's government to share in the profits of any contract awarded by the city. Pop. (1910) 670,585.

M. A. DEWOLFE HOWE,

Author of 'Boston: The Place and the People.'

Boston Case, in the history of slavery, a case where a Georgia slave hid or was hidden on the ship *Boston* returning from Georgia to Maine, and on arrival escaped to Canada. The governor of Georgia issued a requisition to the governor of Maine for the surrender of the captain to the Georgia authorities, as a slave-stealer and fugitive from justice; and on his refusal, the Georgia legislature demanded that Congress pass a law obligating the governor of Maine and all others in similar cases to comply with the requisitions. The resolution was never reported on. In his next message the governor of Georgia recommended that "all citizens of Maine who should thereafter come within the jurisdiction of Georgia on vessels, either as owners, officers, or mariners, should be considered to have done so with intent to commit the crime of seducing negro slaves from their owners, and be dealt with accordingly by the officers of justice."

Boston Massacre, a riot in Boston, 5 March 1770, provoked by the British regiments quartered there. On Friday the 2d, some ropemakers started a war of insults with passing soldiers, and on being challenged to a boxing match, used sticks instead, to which the soldiers retorted with cutlasses; several persons were hurt when the fray was stopped by outsiders. Early Monday evening the soldiers passing to their posts from the main guard, at the head of King (State) Street, were met by a crowd



PUBLIC GARDENS AND EQUESTRIAN STATUE OF GEORGE WASHINGTON, BOSTON.

BOSTON MOUNTAINS—BOSTON PORT BILL

armed with canes and sticks, who refused to make way, and shouted insults; the soldiers were about to force a passage when an officer came up and ordered them into the yard; but the alarm-bell had called out the citizens, the hot-heads wished to assault the main guard, and apparently they and the boys set to harrying the sentinel in front of the custom-house opposite the main guard, who about 9 o'clock hit a specially annoying boy with the butt of his musket. The boy ran off and brought a crowd to the spot, headed by one Crispus Attucks (q.v., apparently a half-breed Indian), and pointed out the sentinel, at which they shouted "Kill him! Knock him down!" The sentinel retreated up the steps and loaded his gun amid a shower of snowballs and other missiles; told Henry Knox who was passing, and counseled him not to fire; that he would if they touched him; leveled the gun and warned off the crowd, and called for help from the main guard across the street. A sergeant and seven men were sent to his help, and he came down and took his place in line; soon afterward Col. Thomas Preston joined them, making 10 in arms. They loaded; the crowd jeered, hooted, taunted them as cowards, dared them to fire, and closed about them; the soldiers drove them back with clubs and bayonets; Preston, in turn warned by Knox, rushed among his men, and either with or without his orders they fired, killing Attucks and two others and mortally wounding two more. The crowd fell back, and Preston prevented the men firing again and rejoined the main guard. The drums beat to arms, and the vicinity was soon thronged with divisions of soldiers and masses of enraged citizens. Lieut.-Gov. Hutchinson quieted the tempest by having Preston bound over for trial, placing the implicated soldiers under arrest, and inducing the officers to order the companies back to barracks; but the next day a town-meeting forced Hutchinson to have the regiments removed to the Castle in the harbor. Preston was tried in October and the soldiers in November before the Superior Court, and defended by Robert Auchmuty, assisted by John Adams and Josiah Quincy, who took their futures in their hands from professional duty; Preston was acquitted, six soldiers were brought in not guilty, and two found guilty of manslaughter, branded in the hand, and discharged.

Boston Mountains, a range in western Arkansas, extending into the Indian Territory; highest summits, 3,000 feet above the sea.

Boston News Letter, 1704-76; the first real newspaper issued in America. A periodical called 'Publick Occurrences,' to be issued monthly, or oftener if "a glut of occurrences" made it advisable, had been essayed in Boston by Richard Pierce, 25 Sept. 1690; but it was instantly suppressed by the authorities as containing "reflections of a very high nature," and the first number was the last. The next venture was by John Campbell (q.v.), a Scotch bookseller and postmaster of Boston, who had been actively writing and sending "news letters" of European occurrences to New England governors for a year or more, and thought it would save trouble to print them for all. With official permission he issued on 24 April 1704 the first number of a weekly consisting of a single leaf, 8 x 12, printed on both sides, and dated

"From Monday April 17. to Monday April 24. 1704." It was printed by Bartholomew Green, for many years one of the best printers of Boston, who in 1722 became its editor. Dying in 1732, he was succeeded by his son-in-law, John Draper, who conducted it till his death in 1762, and made it a representative of the best interests of the province; he was a journalist of the highest character. His son Richard Draper, considered the best news compiler of his day, though in feeble health, edited the paper till his death in 1774, when his widow succeeded him and carried it to the end. Draper had been an ardent loyalist, and firmly supported the mother country in the stormy times of the previous decade; his widow naturally shared his feeling, and when the young man Robert Boyle whom she installed as editor showed sympathy with the Revolution, she replaced him by John Howe, who conducted it till the British evacuated Boston, 17 March 1776, when he and Mrs. Draper left with them and the paper ceased to exist. The British government gave her a life pension. There are only three copies of the first number extant: in the Massachusetts Historical Society at Boston, the American Antiquarian Society at Worcester, Mass., and the New York Historical Society at New York. A facsimile of the first page is given in the 'Memorial History of Boston,' Vol. II., page 389. See **NEWSPAPERS, AMERICAN**.

Boston Port Bill, of 31 March 1774, was Great Britain's retort to the destruction of the tea in Boston harbor, 16 Dec. 1773. (See **BOSTON TEA PARTY**.) The maintenance of English authority by force, or abdication in favor of a party which would maintain it, were the only alternatives left to the government. The King's Speech of 7 March 1774 charged the colonists with attempting to injure British commerce and subvert the constitution; and on the 18th Lord North brought in the Port Bill, providing that there should be no further "landing or discharging, lading or shipping of goods, wares, and merchandise at the town and within the harbor of Boston" till the town paid for the tea and promised submission to the laws; that the colony's seat of government should be removed to Salem, and Marblehead made a port of entry; the act to take effect 1 June. Even some of the best friends of America in Parliament at first approved it as moderate and reasonable, as the town could end the punishment at any moment by paying for legitimate merchandise destroyed by riot, and allowing law and order to have their course; but the Whig opposition soon collected itself, and the bill was fought in its various stages by Burke, Barre, Pownall, and others. In spite of them it became a law 31 March, without a division in the Commons, and by unanimous vote in the Lords. The fleet and army were of course to join in enforcing the blockade; Boston was filled with troops, and Gage made commander-in-chief. The immediate results were: a flood of contributions from the other New England towns, of grain and provisions, so great that the Boston leaders boasted that it would become the chief grain port of America if the act were not repealed; and, in connection with the regulating acts for changing the government of the province passed soon after, a speedy union of the colonies for joint defense.

BOSTON SYMPHONY ORCHESTRA—BOSTON TERRIER

Boston Symphony Orchestra, a large orchestra organized in Boston in 1881, having about 80 members in 1903. It gives a series of concerts in Boston annually, and in 1900 inaugurated a series of Wednesday afternoon concerts in New York. Daily rehearsals are the rule throughout the season, and the orchestra plays only at concert performances. The conductors are now appointed for five years; the conductor in 1903 was William Gericke; others who have held the position are, George Henschel, the first, Arthur Nikisch, and Emil Paur.

Boston Tea Party, 16 Dec. 1773. Till shortly before the Revolution, imported teas paid a shilling a pound duty at English ports; but the merchants received a drawback of three fifths on exports to the colonies, who were charged the remaining 44d. in the selling price. As they obtained it more cheaply by smuggling from Holland, there was no English tea trade. In 1767, as part of a series of duties to raise revenue for paying the colonial executives and judiciary, to make them independent of popular control, this duty was reduced to 3d., but to be collected at American ports. This was done with the threefold object of aiding the straitened East India Company to market its tea; substituting a small collectible duty for a larger uncollectible one; and helping to break up the illicit free-trade which was the life of the colonies. The political purposes made Americans invincibly hostile to it. Associations were formed to abstain from the tea, merchants who handled it lost custom, and the Dutch smuggling went on. In 1770 the other new duties were repealed, but that on tea remained. In 1773 the East India Company, with 17,000,000 pounds of unsalable tea stored in London warehouses because of this non-importation, and in imminent danger of a failure most disastrous to English financial and political interests, asked Parliament for a colonial drawback of the entire shilling, to undersell the Dutch. This was granted 10 May, tea ships were sent to Boston, New York, Philadelphia, and Charleston, and consignees or "tea commissioners" appointed in each place. But the colonies were now resolved that no taxes, external or internal, should be paid except under their own control, and set themselves to prevent the collection of the duty. In the other cities than Boston this was done by forcing the consignees to resign, and in New York and Philadelphia the ships were sent back without unloading. In Charleston the duty was left unpaid for 20 days, when by law the customs officers seized it and offered it for sale to pay the charges, but as no one dared buy it, it spoiled unused. In Boston the tax was defeated by the refusal of the consignees—two sons of Gov. Hutchinson and three loyalist friends of his, to resign. On Sunday, 28 November, the Dartmouth, under Capt. Hall and owned by the Quaker Francis Rotch, arrived with 114 chests of tea, and was moored at Griffin's wharf. The committee of correspondence which really governed the province, induced Rotch to defer its entry until Tuesday, and on Monday morning called a great mass meeting at the Old South Church, which resolved that Rotch would enter the tea at his peril. The captain was cautioned to let none be landed, and a watch of 25 men was stationed at the wharf. The consignees, asked to send

the tea back, replied that it was not in their power, but they would store it till they could hear from their constituents. Tuesday afternoon, however, Rotch and Hall agreed to return it without its touching land or paying duty; and the owners of two other ships which arrived shortly after, the Eleanor and Beaver, made the same promise. These ships were moored at the same wharf, so that one guard might serve for all. But by law the ships could not be cleared till the cargo was discharged, and Hutchinson refused to give the owners permits to pass the Castle; had the guns loaded, and Admiral Montagu guarded the mouth of the harbor with two war-ships, though curiously neither of them put a guard on the tea ships. At midnight on the 16th, the Dartmouth's 20 days would expire, and the American victory be practically won by the seizure of the tea for unpaid duty, since none of it would come on the market. But the object of the Boston leaders was not merely to prevent the English exchequer profiting, but to commit the colony to open disobedience of English orders, and have some issue to unite upon with the other colonies. On the 14th Rotch was again ordered by a meeting at the Old South to apply for a clearance, and several leading patriots escorted him to the custom-house to see that he did so. The collector refused to give an answer till the next day, when, upon a final visit from Rotch and his volunteer bodyguard, he definitely refused unless the teas were discharged. At 10 the next morning Rotch appeared before another huge meeting at the Old South and reported the refusal. He was directed to protest against it at once, and apply to Gov. Hutchinson for a permit to pass the Castle. Hutchinson was at his house on Milton Hill, some eight miles out; and it was 6 P.M. before Rotch returned with the news that the governor also refused. Meantime some 7,000 people had gathered in and about the Old South, probably half of them from neighboring towns; addresses were made by Samuel Adams, Josiah Quincy, and several other leaders, and it was unanimously resolved that the tea should not be permitted to land. Hutchinson's refusal had been discounted, and 40 or 50 men disguised as Indians, with paint and gear, had gathered in the back room of a printing office near by, waiting for an agreed signal, and the meeting continued in session till long after dark, waiting Rotch's report. On receiving it, Samuel Adams gave the appointed signal, "This meeting can do nothing more to save the country," and a shout from the porch was answered by a war-whoop from the "Mohawks"; who at once rushed to the wharf followed by a thousand or so of others, and with perhaps a hundred of them boarded the ships, and for three hours worked steadily with hatchets, breaking open the chests and throwing the tea into the harbor. The entire 342 chests on the three ships, valued at about £18,000, were destroyed, without a sound from the mob, which then dispersed. Meantime a fourth tea ship was wrecked off Cape Cod. The immediate result of this was the Boston Port Bill (q.v.); but as the Bostonians had expected, the whole country rallied to their support.

Boston Terrier, a breed of dogs, resembling bull-dogs without their eccentricities, which originated in Boston about 1870, and

BOSTON UNIVERSITY — BOSTON AND MAINE RAILROAD

soon became popular for its admirable qualities as a companion. This terrier has a shapely bull-dog-like head, and the straight legs and active manners of the old bull-terrier. Those truly bred always have a white muzzle, a white blaze on the face and on the chest and feet, with a fine coat, short and bright, and a deep broad chest. Light-class ones weigh from 15 to 23 pounds, and the heavy from 23 to 30 pounds. This breed arose from a cross between Robert C. Hooper's "Judge" (a dog three quarters English bull and one quarter white terrier, which was a rich dark brindle with a white flare on his face), and Burnett's "Gyp," a pure white bitch low on the legs and stockily built, not unlike the old-fashioned bull-terrier. The product was Wells' "Eph." He was born in Boston about 1870 and was bred to Tobin's "Kate," an old-fashioned bull-terrier, and the result, Barnard's "Tom," may be said to be the first of the real new breed, for he developed the typical screw tail of the present Boston terrier. This dog has a most affectionate disposition, is well knit in build, and is stylish.

Boston University, a co-educational institution of Boston, Mass., organized in 1869. The work is divided into two main departments, the Schools requiring previous college training, and the Colleges requiring no such qualification. The schools are those of theology, law, medicine, and all sciences (for post-graduate work in language, philosophy, history, and science); the colleges are those of Liberal Arts and of Agriculture, the latter allied with the Massachusetts Agricultural College at Amherst. In 1910 the number of students was 1,566, and the number of professors and instructors 158; volumes in the library, 30,000.

Boston, a game of cards played by four persons, with two packs of cards. The cards are never shuffled; one of the packs is dealt, and the other cut alternately to determine the trump, which governs the game. The dealer deals five cards to each player twice, and three the last time around. If the first player can make five tricks, he says, "I go to Boston"; and his competitors may overbid him by saying, "I go 6, 7, 8, 9, 10, 11, 12, or 13," as the hand of each may warrant. Should either of them fail to make the number of tricks he "bids" for, he must pay to each competitor a forfeit regulated by a card of prices, which must be prepared beforehand. Without such a card Boston cannot be played. It is one of the most complicated of games. It is said to have been introduced into France by Dr. Franklin, who gave it the name of his native city.

Boston and Albany Railroad.—The Boston and Albany Railroad as it now exists was formed 28 Dec. 1870, by the consolidation of four railroad companies whose histories respectively are as follows:

The Boston and Worcester Railroad Company, chartered 23 June 1831, built a line between Boston and Worcester, a distance of 44.63 miles, the road being opened to the public 4 July 1835. This company prospered and at the end of eleven years the track between the two cities was paralleled. Branch roads were built to Milbury and Saxonville, to Lower Falls, Milford and Brookline, and to Framington Center, and were opened respectively in 1846, 1847 and 1849.

Meantime, on 15 Feb. 1833, the Western Railroad Company was chartered to build a line from the terminus of the Boston and Worcester road to Springfield, Mass., and thence to some point on the western border of the State. This road was opened to the public in 1841.

The Albany and West Stockbridge Railroad Company was chartered 5 May 1836, to build a line from Albany, N. Y., to the terminus of the Western Railroad Company on the Massachusetts State line, a distance of 39 miles, the company being financed by the Western Railroad Company. The construction of the road was begun two years after the date of its charter and in December, 1840, a section of the road from Albany to Chatham Four Corners was opened. In November, 1841, the Albany and West Stockbridge Railroad Company was leased to the Western Railroad Company for a term of 50 years from April, 1840. Work was now resumed on the remainder of the road, which was completed in September, 1842.

In 1854 interests allied to the Western Railroad Company purchased the Hudson and Boston Railroad, whose line extended from Hudson to the Massachusetts State line, a route parallel to that of the Albany and West Stockbridge Railroad. On account of this latter fact that part of the Hudson and Boston's line lying between Chatham Four Corners and the Massachusetts State line was abandoned.

In September, 1867, the Boston and Albany Railroad was formed by the consolidation of the Boston and Worcester and the Western Railroad Companies. In December, 1870, the new corporation absorbed the leased Albany and West Stockbridge, and consolidated with the Hudson and Boston road, forming the present Boston and Albany Railroad.

In 1866, by purchase of the Grand Junction Railroad the line was extended to East Boston; in 1880 the Springfield and Northern Railroad was purchased and put into operation as the Athol Branch; in 1889 the company bought the Spencer Railway.

The Boston and Albany Railroad is now leased to the New York Central and Hudson River Railroad Company (q.v.), the lease holding good for ninety-nine years from date, 1 July 1900. For this lease the lessee pays an annual rental of two million dollars, equivalent to eight per cent on the capital stock of the leased road.

In addition to this the lessee pays the organization expenses, a sum which at present amounts to \$10,000 per annum; the taxes; the interest on bonds of the leased road; and the rentals which the leased road pays for its leased lines. These lines, leased by the Boston and Albany, comprise the North Brookfield Railroad, the Pittsfield and North Adams Railroad, and the Ware River Railroad.

Boston & Maine Railroad. The Boston & Maine system, as it stands to-day, is one of the most remarkable examples of railroad evolution and consolidation to be found in the world. Including the constituent roads owned, leased, controlled, and operated, it represents fully 125 distinct units, ranging from a four or five-mile line, like the Troy & Bennington, to a great 400-mile "system," like the Fitchburg division. Some of its branches were incorporated as far back as the early thirties, while others are creations of the last 15 or 20 years.

BOSTON AND MAINE RAILROAD

To bring together all of these different and sometimes conflicting transportation units under a single management represents a feat of financing probably unique on this continent. Of the 2,290 miles now operated by the Boston & Maine Railroad no less than 1,665 miles represent roads leased by the parent company. One of these, the Troy & Bennington, is leased in perpetuity, and the lease having the longest term to run is that of the Vermont & Massachusetts road, which expires in 2873. The Massachusetts Valley road lease expires in 2869, the Fitchburg road lease in 1999, and the one to first expire will be that of the Suncook Valley road, in 1912.

To give a clearer idea of the full extent of the Boston & Maine Railroad system the following table, showing the leased roads, with the dates of their incorporation, the beginning and expiration of leases, and mileage has been prepared under the direction of Fourth Vice-President William J. Hobbs:

NAME OF ROAD.	DATE OF INCORPORATION.	DATE OF LEASE.	DATE OF EXPIRATION.	MILES OF ROAD.
Danvers	March 15, 1852	May 30, 1853	May 30, 1953	9.26
Newburyport, Danvers & Georgetown.....	May 7, 1851	Feb. 21, 1860	Feb. 21, 1960	26.98
Newburyport	March 11, 1846			
Lowell & Andover	Feb. 5, 1873	Oct. 18, 1875	Dec. 1, 1973	8.85
Kennebunk & Kennebunkport.....	Aug. 16, 1882	June 18, 1883	May 15, 1982	4.50
Worcester, Nashua & Rochester.....	March 5, 1845	Oct. 30, 1885	Jan. 1, 1936	94.48
Worcester & Nashua	July 5, 1867			
Nashua & Rochester.....	June 30, 1847	June 1, 1887	Sept. 1, 1937	22.39
Manchester & Lawrence.....	June 8, 1830	June 22, 1887	April 1, 1986	111.75
Boston & Lowell.....	April 16, 1836	Nov. 30, 1880	Oct. 1, 1979	14.50
Nashua & Lowell.....	March 26, 1845	Sept. 30, 1884	Jan. 1, 1989	13.16
Stony Brook	Dec. 28, 1844	Feb. 1, 1884	Oct. 1, 1982	15.50
Wilton	July 7, 1866	April 1, 1893	April 1, 1986	10.50
Peterboro	Dec. 27, 1844	Dec. 30, 1889	Jan. 1, 1989	172.32
Northern	Nov. 10, 1835	June 1, 1887	Jan. 1, 1986	110.30
Connecticut & Passumpsic.....	1862	Dec. 7, 1871	July 1, 2869	35.46
Massachusetts Valley				
Connecticut River, Northampton & Springfield.....	March 1, 1842	Jan. 1, 1893	Jan. 1, 1992	79.85
Greenfield & Northampton	Jan. 25, 1845			
Concord & Montreal	June 27, 1835	June 29, 1895	April 1, 1986	387.10
Concord railroad	Dec. 27, 1844			
Boston, Concord & Montreal.....	1845	May 26, 1862	Jan. 1, 1961	39.87
Concord & Portsmouth.....	July 1, 1863	March 11, 1870	Jan. 1, 1912	17.41
Suncook Valley	July 9, 1874	March 31, 1883	Feb. 1, 1982	22.93
Pemigewasset Valley	Feb. 19, 1891	June 21, 1893	June 19, 1992	5.19
New Boston	Aug. 4, 1887	Oct. 8, 1895	April 1, 1986	4.95
Franklin & Tilton	March 3, 1842	June 30, 1900	July 1, 1999	394.14
Fitchburg	March 15, 1844	Jan. 1, 1874	Jan. 1, 2873	58.58
Vermont & Massachusetts.....	March 27, 1851	Oct. 12, 1872	Perpetuity	5.04
Troy & Bennington				
Total mileage				1,665.01

While it is impossible to give anything like a complete history of such a complicated system as that of the Boston & Maine Railroad in such a brief sketch as this must be, it is important to note some of the events in its history which stand out most conspicuously. For example, it is certainly worthy of record that the original railroad—the acorn from which the present great Boston & Maine system has sprung—was first conceived in the brain of its founder, Hobart Clark, of Andover, Mass., in the fall of 1832.

Mr. Clark, after traveling over the Albany & Schenectady Railroad, then the only line west of the Hudson river, saw the utility of a branch railroad to Andover, tapping the Boston & Lowell road (then under construction) at Wilmington.

The road was, in 1833, granted a charter under the name of the Andover & Wilmington Railroad, the first directors being Hobart Clark,

Abraham Marland, Amos Abbott, John Smith, and Merrill Pettingill, all residents of Andover. The capital stock was \$100,000.

Hobart Clark was elected president, and the road was surveyed under the direction of Col. Loammi Baldwin, of Charlestown, Mass., the well-known civil engineer.

Work was commenced in the spring of 1835, and the first section of the road was opened to Andover 6 Aug. 1836. By the fall of 1837 it had been opened to the Merrimac river, at Bradford; by 1840 to Exeter; by 1841 to Dover, and by 1843 to South Berwick Junction.

In 1835, a second charter had been obtained allowing the extension of the road to Haverhill, and the name was changed to the Andover & Haverhill Railroad; and a little later in the same year a charter was obtained from the New Hampshire Legislature for a road from the Massachusetts line through New Hampshire to the Maine State line, under the name of the Boston & Maine Railroad.

In the following year the Maine Legislature granted a charter extending the line to Portland, and thus was finally organized the original Boston & Maine Railroad, which to-day serves a very large section, annually transports 40,000,000 passengers and nearly 20,000,000 tons of freight, earns \$35,000,000 a year, owns 17,000 freight cars and 1,200 passenger cars, carries a veritable army upon its payrolls, and operates in five States and one Canadian province.

In addition, the Boston & Maine, through ownership of a majority of the capital stock, also controls the Maine Central Railroad, although that is separately operated.

The system had its beginning in the day of small things, and to-day it exists in an era of great ones, as far as railroad policies are concerned.

The slow but certain process of amalga-

tion which has resulted in the present vast transportation system under one management has been an exceedingly interesting one, but its history would require too much space to be given even in outline here.

It has been attended by many exciting episodes, legislative and financial, particularly with reference to the leasing of the Connecticut River road in 1893, the Concord & Montreal in 1895, and the Fitchburg in 1900.

These leases were hotly contested by minority stockholders or opposing interests, but most of the leased lines were absorbed without much show of opposition.

It has for some time been the policy of the company to purchase outright its leased lines, whenever that has been practicable.

In view of the present highly-organized condition of railroad operation it is noteworthy that when the original Boston & Maine road was first built and operated the telegraph had not been invented and double tracks were essential for the safe operation of trains.

Moreover, civil engineering was then in its infancy and surveying instruments were clumsy and primitive, the transit not even having been produced at that time.

Few of those who were engaged in building the road had ever had any experience in such work, for railroads themselves were very new then, and there is a tradition that fully 75 per cent of the surveying for the line was done without instruments and by purely visual work. There were no time fuses to aid in blasting, and not even friction matches had come into existence.

Aside from the relocation of a part of the Central Massachusetts division, made necessary by the construction of the great Wachusett reservoir, the only considerable piece of railroad in the territory now controlled by the Boston & Maine which has ever been actually abandoned was part of the original Portsmouth & Concord road. This line once ran between Suncook and Candia, and that portion of it was afterward given up for a more favorable location.

According to the latest financial report issued by the company—that for the year ending 30 June 1910—the total earnings of the road during the previous 12 months were \$43,357,175. Deducting operating expenses, \$31,336,324, left the net earnings \$12,020,851, an amount that was further increased to \$12,809,863, by the addition of \$789,012, which represented the road's income from other sources.

EDWARD O. WOODWARD,
Conveyancer, B. & M. R. R.

Bostonians, *The*, a novel of American life, by Henry James, published in 1886. Written in a satirical vein, it presents with unpleasant fidelity a strong-minded Boston woman possessed by a "mission," "who takes life hard," is never so happy as when struggling, striving, suffering in a cause which throughout the novel is the emancipation of women.

Boswell, James, English writer: b. 29 Oct. 1740; d. 19 May 1795. He was the son of a Scotch judge, Lord Auchinleck, who took this title from the name of his estate. He was educated at Edinburgh and at Glasgow, and early displayed literary tastes. In 1763, when on a visit to London, he was introduced to Johnson, and though this first meeting was not

very hopeful for the future, a warm friendship soon sprung up between them. During a year spent on the Continent, he made the acquaintance of Voltaire, Rousseau, and other prominent men of the day. Returning in 1766 he was admitted an advocate, but the practice of his profession was little to his taste. In 1768 he published a history of Corsica, with a lively account of his own experiences in the island. The same year he again met Johnson in London, and his intercourse with him was kept up by many subsequent visits to the metropolis; while Johnson himself came to Scotland in 1773, when the pair made their famous journey to the Hebrides. This year also Boswell became a member of the famous Literary Club, with various members of which, such as Burke and Reynolds, he was on terms of intimacy. In 1769 he had married, but he continued mainly dependent on his father till the latter's death in 1782, when he succeeded to the estate. In 1784 he met Johnson for the last time at a dinner at Sir Joshua Reynolds'. Two years after (1786) came out his 'Journal of a Tour to the Hebrides with Samuel Johnson, LL.D.' (Johnson's own account of the tour had appeared in 1775). Having latterly been admitted to the English bar, he went on circuit and held for a year or two the recordership of Carlisle; and from 1788 onward he mostly resided in London. In 1791 appeared his 'Life of Johnson,' a work which he had been long preparing, and which at once gave readers the same delight as it has ever since inspired. A second and enlarged edition came out in 1793. By this time Boswell's health had greatly suffered from his too convivial habits, and he died in London having been a widower since 1790. Boswell was a singular compound of sense and folly, of genuine ability and foible bordering on craziness. His good nature was universally admitted; his vanity and want of self-respect and self-control were his most evident faults. His weaknesses were easily seen, but the man who enjoyed the sincere affection of Dr. Johnson and the enduring friendship of Burke and Reynolds had better stuff in him than appeared to the superficial observer. His life of Johnson is such a masterly performance as only a genius for life-portraiture could have produced. Among editions of the *Life* may be mentioned that of Croker (10 vols.) and those of Rev. A. Napier (Bohn's Standard Library, 6 vols.), and Dr. Birkbeck Hill (Clarendon Press, 6 vols.), all containing the *Tour*. See Macaulay's essay, and the much more humane and penetrating essay by Carlyle. Boswell left two sons. The elder, ALEXANDER, born in 1775, succeeded to the family estate, sat for a year or two in Parliament, and was created a baronet in 1821. He wrote several well-known Scottish songs and various other things in verse and prose, and also set up a private press from which issued reprints of rare old works in the Auchinleck library. In 1822 he met his death in a duel with a Mr. Stuart, against whom he had made some severe attacks in a political journal. JAMES, the second son, born in 1779, died in 1822, was the editor of an improved edition of Malone's *Shakspeare*, generally known as the 'Variorum *Shakspeare*' (21 vols. 1821).

Bosworth, Francke Huntington, physician: b. Marietta, Ohio, 25 Jan. 1843. He was educated at Yale and Bellevue Hospital Medical

colleges. He is professor of diseases of the throat in Bellevue, consulting physician to the Presbyterian and St. Vincent's hospitals, and an authority on diseases of the nose and throat. Publications: 'Manual of Diseases of the Throat and Nose' (1881); 'A Study of Nasal Catarrh' (1882); 'Growths in the Nasal Passages'; 'The Three Tonsils'; 'Treatise on the Diseases of the Nose and Throat'; 'Malignant Disease of the Upper Air Tract'; 'Taking Cold'; 'Text-Book of Diseases of the Nose and Throat.'

Bosworth, Joseph, English philologist: b. Derbyshire, 1789; d. 27 May 1876. He was educated at Repton, Aberdeen, and Trinity College, and was ordained deacon in 1814, and after filling several livings in England was British chaplain at Amsterdam and Rotterdam for 12 years. He devoted much time to researches in Anglo-Saxon and its cognate dialects, the result of his studies appearing from time to time. His chief works are his 'Anglo-Saxon Grammar; Dictionary of the Anglo-Saxon Language; and Compendious Anglo-Saxon and English Dictionary.' In 1857 he was presented to the rectory of Water Shelford, Buckingham, and next year was appointed Rawlinson professor of Anglo-Saxon at Oxford, a post which he held till his death. He was M.A. and LL.D. of Aberdeen; Ph.D. of Leyden, and D.D. of Cambridge. In 1867 he gave \$50,000 to establish a professorship of Anglo-Saxon at Cambridge. He left a certain amount of materials that he had accumulated for a new edition of his larger Anglo-Saxon Dictionary, and these have been utilized and greatly added to by Prof. Toller of Manchester in the copious Dictionary which has been published under his editorship by the Clarendon Press.

Bosworth, or Market-Bosworth, England, a small town in the county of Leicester, about three miles from which is Bosworth Field, where was fought, in 1485, the memorable battle between Richard III. and the Earl of Richmond, afterward Henry VII. This battle, in which Richard lost his life, put a period to the long and bloody Wars of the Roses, between the houses of York and Lancaster.

Bot-fly. In these flies, so interesting in their habits, the body is stout, hairy, like the humblebees, and they are easily recognized by having the opening of the mouth very small, with rudimentary oral organs. The middle part of the face is exceedingly narrow, and the minute antennæ are inserted in rounded pits. The eggs hatch very soon after laying, and Riley thought, from the testimony of three independent witnesses, that the sheep bot-fly is viviparous, the larvæ hatching within the body of the parent, who deposits in the nostrils of the sheep the perfectly formed and living grub.

The larvæ are, in general, thick, fleshy, footless grubs, consisting of 11 segments exclusive of the head, which are spined and tuberculated, the former in rows, which enable them to move about readily when living under the skin or in the frontal sinus, and thus greatly irritate the animals on which they live. The stigmata are placed in a scaly plate on the thickened posterior end of the body. The mouth of the cutaneous larvæ consists simply of fleshy tubercles, while in those species that live in the stomach and frontal sinuses of their hosts, it is provided with

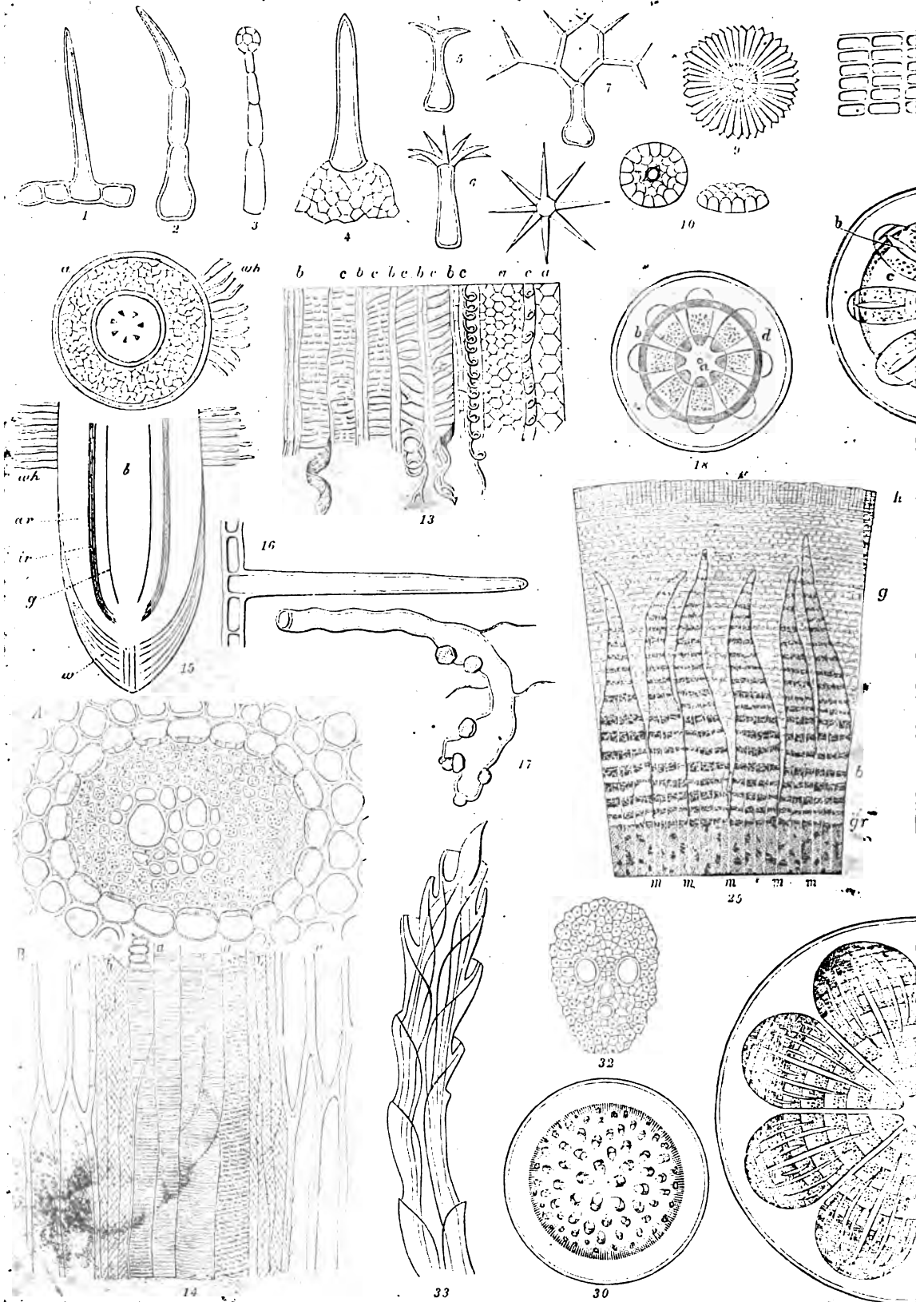
horny hooks. While in this state they moult twice, and then attain their full size. They feed on the purulent matter originating from the irritation produced by the movements of their bodies. Just before assuming the pupa state, the larva leaves its peculiar habitat, descends into the ground, and there becomes a coarctate pupa (see PUPA).

Besides the horse bot-fly (q.v.), the ox bot-fly (q.v.) and the sheep bot-fly (q.v.), there is included in the genus *Dermatobia* the "ver macaque" of Cayenne and Mexico, which is found beneath the skin of man in tropical America. It is disputed whether it be a true indigenous "*Cestrus hominis*," or one that originally attacks the monkey, dog, or other mammal. In Cayenne the species attacking man is called the "ver macaque"; in Eastern Brazil (Para) "ura"; in Costa Rica, "torcel"; in Colombia, "gusano peludo," or "muché." The "ver moyocuil" (*D. noxialis*) lives on the dog, sheep, cattle, and man; and is found in Mexico and New Granada. The larvæ are long, cylindrical, S-shaped, differing greatly in form from others of this family. The flies are closely allied to those of the preceding genus.

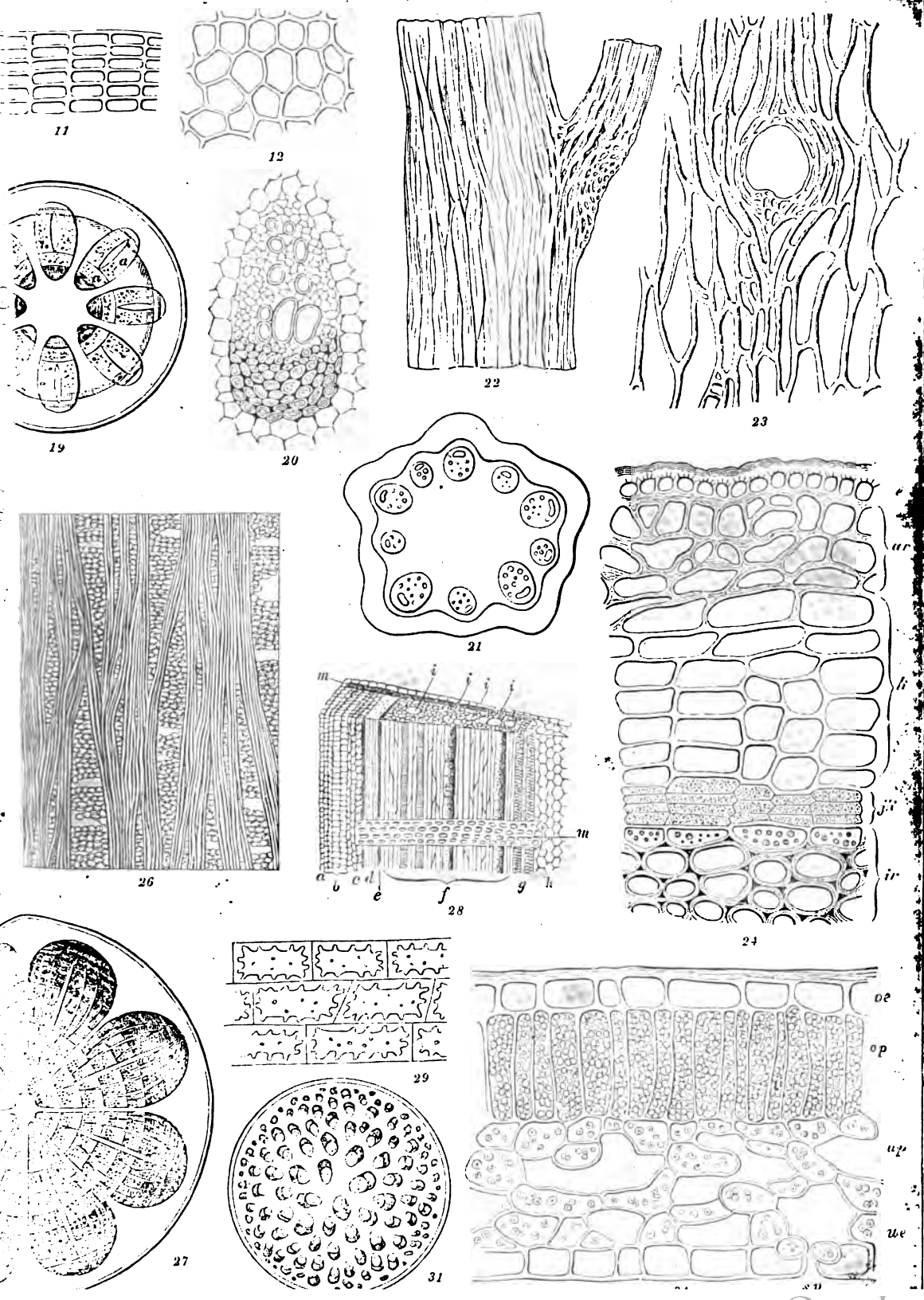
Leidy states that several specimens of the larva of a bot-fly were obtained in Honduras (by Le Conte). They were usually found beneath the skin of various parts of the body, and the eggs were suspected to have been introduced while the persons were bathing. The men were not aware of the circumstance, and the presence of the larva gave them comparatively little uneasiness. According to Kreff, a species of *Batrachomyia* is parasitic upon four species of Australian frogs. The larvæ are found between the skin and the flesh behind the tympanum. When they quit the frog the latter dies. The change to the pupa state is usually effected on the lower surface of a piece of rock in some damp locality. The perfect insect emerges in 32 days. Consult: Packard, 'Guide to Study of Insects' (1889); Brauer, 'Monographie der Oestriden' (Vienna 1863); Osborn, 'Insects Affecting Domestic Animals' (1896).

Botallack, a mine on the west coast of Cornwall, England, eight miles north of Land's End. The works are on the edge of the cliff: part of the underground workings (abandoned in 1875) extended 2,448 feet beneath the sea. The mine has been wrought for both tin and copper.

Botanical Gardens. The term botanical garden is used to designate a limited area of ground on which is grown a collection of plants including a large number of species brought together to subserve scientific, educational, æsthetic, or economic purposes. In the broadest sense, it is a museum of plants, and one of its chief ends is to represent, by means of living specimens so far as possible, the principal types of vegetation of the earth. It is impossible to cultivate more than a few thousand species on any given area under the natural conditions of soil and climate, and the open-air plantations are generally supplemented by collections grown under shelter, in glass houses, and in specially prepared soils. It has been found practicable to grow in this manner as many as 12,000 or 15,000 species of the higher plants in the botanical gardens at St. Louis and New York, at Kew, England, and at Berlin, Germany. A



s. ^{1 10} Epidermal Appendages. ^{11 12} Outer Bark of Birch. ¹³ Longitudinal section of vascular bundle in the Balsam. ¹⁴ Cross a
 Dicotyledonous stem. ²⁰ Cross section of a vascular bundle in do. ²¹ Cross section of stem of Clematis. ²² Network o
 in Lime-tree. ²⁷ Ideal section of a Dicotyledonous stem. ²⁸ Ideal structure of Exogenous stem. ²⁹ Medullary r
³³ Longitudinal section of Root stock of Iris



proper selection of this number may be made to represent somewhat fairly the principal forms of plants, which include about 250,000 species. That is to say, it is possible to grow in one place about one species out of every 17 in existence.

Living plants cultivated in the open air are most suitably arranged in plantations according to their general habit, and in such manner as to show their general relationships. Then special groups are often made of certain families, such as the conifers, the willows and poplars, the grasses, ferns, or mosses. The most common arrangement of plantations includes the herbaceous grounds, the aquatic plants, alpinum, viticetum, fruticetum, arboretum, and economic plantations. Some institutions bring together collections for the purpose of illustrating the local flora, or the flora of any given geographical district.

The herbaceous plantations are intended to include the representatives of small soft-bodied plants which die down to the soil during the winter or resting season, and which may or may not have a perennial underground stem-formation of some kind. Many of the species are annuals and must be grown from seeds every year.

The pools for aquatic plants are arranged to afford suitable means for the culture of forms which float or root in ponds and streams of fresh water, and include a wide variety, such as the water-lily, pondweeds, *Philotria*, water-hyacinth, etc.

An alpinum is a special plantation generally arranged to afford means of cultivation of species from cold climates on mountain-tops or in higher latitudes. Plantations of this kind are often termed rockeries, and are in the form of a ridge or hill covered with boulders. In such plantations precautions must be taken to give lime-loving plants a place among limestone rocks, and with the necessary low temperatures.

The viticetum is a plantation devoted to the cultivation of climbing and trailing vines, and may take almost any form demanded by the exigencies of practical gardening. Among the necessary features are trellises or supports for twining and tendril climbing forms.

The fruticetum includes all woody perennial plants which do not form a central trunk six feet in height, and which are therefore not trees. These are most effectively grouped when the individuals of the separate species are placed in the ground separately in a scheme of general arrangement by which every plant may be inspected from all sides and is unshaded by its neighbors.

The arboretum includes trees, and these may be variously arranged, singly or in groups, always with respect to their mutual relationships. On account of their great size and comparatively slow growth and greater permanency, the placing of trees in any given landscape scheme in a garden is attended to with the greatest care.

The economic plantations may include useful plants arranged according to their relationships, and grouped according to the use or nature of the derivative. Thus a division may be made in which only species used for medicine, foods, or clothing are included, or a division may be made to include plants which yield starches, oils, gums, and resins.

Special plantations of selected families must

depend for their constituency upon the location of the garden. Thus it would be possible to form a collection of palms in a tropical garden; and one of pines or willows in a temperate climate. Geographical plantations may take any given district by variously arranged plantations.

Still another group of plantations is being made in some gardens to illustrate types of habit and structure. Some of the principal groups to be illustrated in this manner are parasites, which draw nourishment from the living bodies of other organs; saprophytes, which live on decaying organic matter; xerophytes, plants adapted to living under the driest conditions; plants with structures serving as a protection against animals. Forms of propagation and reproduction, methods of dissemination of spores and seeds, etc., also serve as subjects to be illustrated by separate groups.

The collections grown under shelter and in conservatories are generally grouped in such manner that species are partly assembled with regard to their climatic requirements, and partly according to their relationships. Thus a house may be devoted to tropical plants, or to temperate plants, or may contain only orchids, palms, ferns, cacti or succulents, or other special groups.

The part of the vegetable kingdom which may not be cultivated may be represented in a museum by dried specimens, material in preserving-fluids, and dissections of various kinds. Here again the arrangement may be upon the basis of natural relationship, or upon the basis of economic usefulness. The species which formed the vegetation of the previous geological periods are represented by fossil specimens, completing the history of the plant-world so far as it is known, and yielding suggestions as to the descent of the present types.

Two general educational purposes are served by an institution of this character. Its collections are arranged to present information on the form, relationship, mode of life, habit, and general biological character of the principal types of vegetation, in such manner as to be capable of comprehension by persons unacquainted with the technical aspects of the subject. Further interpretation of such facts may be made by means of books, journals, lectures, etc., devoted to this branch of work and study.

The material accumulated for the exploitation of popular knowledge of plants also affords an excellent basis for the induction of students into the more strictly scientific aspects of botany; and when such material is supplemented by laboratories furnished with apparatus, microscopes, and other instruments of precision, the activities of these students may be carried beyond the frontiers of the subject into the investigation and discovery of new facts and phenomena. This extension of the boundaries of knowledge concerning the plant-world may be carried on to advantage only when a library is at hand containing all of the more important literature bearing upon the subject.

Botanical gardens owe their origin to the needs of medical science, in accordance with which species showing valuable medical properties were grown in convenient places.

The first authentic record of the introduction of medicinal plants into cultivated plots of ground dates no farther back than the time of

BOTANICAL GEOGRAPHY — BOTANY

the elder Pliny (23-79 A. D.), who writes of the garden Antonius Castor, at Rome, in which were grown a large number of medicinal plants. This step, however, may have been taken much earlier by the Greeks, Chinese, or Mexicans. Later the Benedictine monks of northern Italy paid great attention to the growing of remedial herbs, and devoted an important proportion of the monastery gardens to this purpose. This practice was also carried beyond the Alps, and in 1020 a garden was in existence at the monastery of St. Gall, in Switzerland, not far from Lake Constance, which contained 16 plots occupied by medicinal plants. A garden of this character was founded 1309 at Salerno, and another at Venice 1330.

The 16th and 17th centuries witnessed the foundation of many gardens in England, France, Germany, Holland, and Sweden, some of which have had a continuous existence to this day. The garden of Bologna was founded 1568; Leyden, 1577; Leipsic, 1579; Montpellier, 1596; Paris, 1597. The last-named was organized for the determination of "what variations were possible in the style of bouquets worn at the royal courts." Then followed the establishment of the gardens at Giessen, 1605; Strasburg, 1620; Jena, 1629; Oxford, 1632; Upsala, 1667; Chelsea, 1680.

The number of these institutions at the present time is nearly 300, only a few of which, however, are devoted to the more important purposes named above. Many botanical gardens are merely municipal parks in which some attempt is made to exhibit special groups of plants, and are devoted chiefly to floriculture. Others are almost entirely experiment stations for the exhibition and testing of economic species, while still others find their chief usefulness as an aid in teaching botany in schools and colleges.

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Botanical Geography. See DISTRIBUTION OF PLANTS.

Botany is that branch of biology, or the science of living organisms, which deals with plants, and is thus distinguished from zoology, which deals with animals. An individual plant, considered as a living or once living organism, may be studied in two ways — with reference to its structure or with reference to its functions. These represent the two great subdivisions of pure botanical science — anatomy and physiology respectively. All other phases of botanical science are special developments of one of these two, either alone or in combination with the other, or in relation additionally to some other branch of knowledge. Anatomy and physiology are thus the primary elements, as it were, of botany, which in varying combinations with each other and with the elements of other sciences constitute the branches of botanical science actually in existence, such as taxonomy, ecology, cytology, and pathology. The term plant anatomy is restricted frequently in actual use to gross anatomy and is often called structural botany. In this sense is covered about as much of the whole of anatomy as can be studied by the unaided eye or with a lens. Minute anatomy, or histology, covers the minute structure of plants,

the principal instrument in its study being the compound microscope. A study of the relationships of plants on the basis of anatomical resemblances constitutes comparative anatomy, or morphology. The classification of plants, known as taxonomy or systematic botany, is in the main a specialized branch of morphology, for the principal means by which plants may be grouped so as to indicate their genetic relationship is a comparison of their structural differences and resemblances. In its actual study plant physiology is closely associated with plant histology because most of the functions of the plant are intimately connected with the structure of plant cells, and the physiologist must of necessity understand these structures. A special branch of botanical research which has to do with the complex structure and activities of the plant cell is known as plant cytology. The study of the diseases of plants, whether they are due to fungi or other plant organisms, or are purely physiological, is plant pathology, sometimes called vegetable pathology.

History.—Among the ancients, Aristotle the Greek philosopher (384 to 322 B.C.), Theophrastus his pupil (about 372 to 287 B.C.), the Roman naturalist Pliny the Elder (23 to 79 A.D.), and the Greek physician Dioscorides (of the 1st or 2d century A.D.) left botanical records of historical interest, but botany as a modern science has developed in the last four centuries, dating from the Reformation. The writing, particularly by the Germans, of herbals, or treatises on economic and medicinal plants, and the founding of botanical gardens, occupied most of the 16th century, but in the year 1583 Cesalpino, an Italian physician, published the first formal and comprehensive classification of plants. This, though artificial, formed the basis of all generally recognized classification to and including the time of Linnæus in the latter part of the 18th century. The 17th century was chiefly notable for advances not in the classification of plants, but in their structure and vital processes. Malpighi, an Italian, and Grew, an Englishman, almost simultaneously published their researches on the gross anatomy and the cellular structure of plants, the first of which were presented in 1671. To the work of these men in plant anatomy little of importance was added in more than a hundred years. The other important discovery of the century was the demonstration by Camerarius in 1691, through direct experiment, of the sexuality of plants. The 18th century was marked especially by advances in classification. In the year 1700 Tournefort published his 'Institutiones,' in which for the first time genera were systematically named and described. During this century Linnæus, the great botanical compiler and systematizer, brought out his successive works, culminating in the 'Species Plantarum,' in 1753. It was later in the same century, too, that botanical exploration came to be recognized as an important department of the voyages of geographic and scientific discovery in which the nations of Europe became engaged. In 1789 A. L. de Jussieu published his 'Genera Plantarum,' in which was first systematically formulated a comprehensive classification of plants according to their natural relationship, as opposed to the artificial systems followed by Cesalpino and Linnæus. In the last two decades of this century were laid the foundations of our present know-

BOTANY.



An Alaskan Valley, Covered with Arctic Vegetation (upper).
Spruce Forest of Interior Alaska, Representing the Boreal Zone (lower).

BOTANY

ledge of the important part played by the air in the nutrition of plants, a proper conception of which was possible only in the light of the new developments which took place at that time in chemistry. The 19th century witnessed enormous strides in plant anatomy and plant physiology, the latter largely contributed to by workers in chemistry and physics, and the former rendered possible by improvements of the compound microscope and accessory instruments, especially those which came into general use about 1840. From this movement has been derived most of our knowledge of the life history and relationship of the lower groups of plants, the fungi, algæ, and lichens, and the assignment of the pines and their relatives to their true position next above the ferns. The whole realm of botanical research was profoundly affected by the work of Darwin, beginning with the publication of his 'Descent of Man,' in 1858, which gave a new point of view for all subsequent work. In systematic botany the principle of the development of species from a common ancestor was substituted for the old view of the constancy of species. The remarkable adaptations for cross fertilization in the coloration, odor, and structure of flowers was given its true and significant explanation as a means for originating and perpetuating species. Darwin's work gave a new philosophical basis for the interpretation of observed phenomena and facts.

Progress in the United States.—At the beginning of the 19th century the advancement of botany in North America was largely in the hands of physicians, through their requirement of a knowledge of plants as *materia medica*. Professors of botany were unknown. Linnæus and other great botanists in Europe had had American correspondents, and geographic expeditions accompanied by European botanical collectors had touched the margins of the continent. Some botanical exploration, chiefly by European visitors, had been effected east of the Alleghany Mountains. The centre of botanical activity was at Philadelphia, among the members of the American Philosophical Society. With Lewis and Clark's expedition across the continent to the mouth of the Columbia, in 1803-6, began a series of American explorations of the great interior, directed first to the Louisiana Purchase, then to Oregon, and finally to California. These were supplemented on the north by the British expeditions of Sir John Franklin and others in quest of a Northwest Passage. In the fifties began the Pacific Railroad surveys and these were followed by the geological surveys. All these contributed materials for the discovery, description, and orderly arrangement of the North American flora, the collections going largely into the hands of Thomas Nuttall at Harvard University, John Torrey at Columbia, Asa Gray, who was Nuttall's successor, and George Engelmann, a physician of St. Louis. Meanwhile appeared a new factor which was destined to play an important part in the development of botanical science in America, the establishment of agricultural colleges in the late sixties. These institutions created a demand for a class of botanists who did not exist in the United States or anywhere else, botanists who had brought a critical scientific training to bear on the hard problems of agriculture. For the succeeding two decades the universities of the country, including some of the agricultural colleges them-

selves, were busily engaged in educating the required men, a movement which resulted in the preparation of many who were competent not only to act as teachers of botany in the agricultural colleges but, a still more important matter, to act as investigators in agricultural experiment stations, one of which was established in each of the States and Territories in the late eighties. The branch of botany which received its greatest impulse was pathology, the science of the diseases of plants. Plant pathology has already been carried to a point of high scientific development and practical application attained in no other country. Systematic, or, as it is now more commonly known, taxonomic, botany has made rapid strides forward in the past two decades, largely through the application of methods developed and perfected by American ornithologists. These methods differ from others chiefly in a full consideration of the geographic relationships of plants and the examination of very large series of specimens. A new revision of the whole North American flora along these lines and accompanied by systematic botanical exploration is now under way. For the future two lines of inquiry are likely to be conspicuous in American botany, first, the principles of heredity in plants and the applied phase of the subject, plant breeding on a scientific basis; and second, the correlation of plant functions with plant structures, a work which will have far-reaching importance in broadening our understanding of the processes of nature. The geographic location of American botanical research has undergone a profound change as a result of the Spanish-American war. The area to which up to that time the energies of American botanists had been chiefly directed was the north temperate belt of one hemisphere, but they now must deal in addition with botanical problems in the tropics of both the New World and the Old World.

Classification.—The plant kingdom is divisible into five great groups, the *Myxophyta*, or slime molds; the *Thallophyta*, including the bacteria, algæ, fungi, and lichens; the *Bryophyta*, including the liverworts and mosses; the *Pteridophyta*, including the ferns and their allies; and the *Spermatophyta*, or flowering plants. The first four of these are often jointly designated as the *Cryptogamæ*, or cryptogams, in contradistinction to the *Phanerogamæ*, an older name for the flowering plants.

The *Myxophyta*, or slime molds, known also as the *Myxomycetes*, *Mycetozoa*, and *Myxothallophyta*, are organisms which though usually treated as belonging to the vegetable rather than the animal kingdom, have no cellulose walls covering the cells of which they are composed; pass a part of their life as plasmodia, or masses of naked creeping protoplasm similar to the animals known as amœbæ; and are reproduced without even the simplest method of sexual regeneration. Most of them resemble fungi in that they grow upon decayed animal or vegetable matter. The *Thallophyta* include a wide variety of plants, associated with each other by exclusion, on the one hand, from the animal-like *Myxophyta*, and, on the other, from the *Bryophyta* and higher plants. The plant body is commonly not differentiated into stem and leaf, and may even be unicellular; a cell wall is usually present; chlorophyll is often wanting; and frequently sexual reproduction does not ex-

BOTANY

ist. Among the important groups belonging to the *Thallophyta* are the *Schizomycetes*, or bacteria; the *Schizophyceæ*, or bluegreen algæ; the *Euphyceæ*, or true algæ, including the diatoms, desmids, green algæ, stoneworts, brown algæ, and red algæ; the *Eumycetes*, or true fungi; and the *Lichenes*, or lichens. The *Bryophyta*, or liverworts and mosses, are small plants, having in their life cycle a sexual generation in which the sexual organs are borne on a plant body usually differentiated into stem and leaves, followed by a non-sexual generation, which consists of a stalked or sometimes sessile spore-bearing capsule remaining attached to the plant body of the preceding generation. The female organ of reproduction consists of an oosphere in a sac called an archegonium, the walls of which are made up of many cells, much more complex structurally than the female organ of the *Thallophyta*. The male organ consists of motile antherozoids produced from an antheridium. The group consists of the *Hepaticæ*, or liverworts, some of which have a flat scale-like body called a thallus, and of the *Musci*, or mosses. The *Pteridophyta*, represented by the ferns, resemble the *Bryophyta* in their sexual organs, but differ in the possession of what is known as vascular, as opposed to merely cellular, tissues, and also in that the asexual generation becomes a large plant and maintains a separate existence independent of the earlier generation. The group includes, besides the true ferns, the grape-ferns, jointrushes, clubmosses, quillworts, and a few others. The *Spermatophyta*, or flowering plants, also known as *Anthophyta* or *Phanerogama*, find their essential difference from the *Pteridophyta*, not in the production of flowers, but in the relationship of the sexual and the asexual generations and in the character of the sexual organs and their embryonic product. In an ordinary fern the sexual generation is a small flat green organism, resembling a thallose liverwort, growing on the ground or other substratum and deriving its nourishment from it, but in the *Spermatophyta* the sexual generation is reduced to almost microscopic dimensions, and leads no independent existence but is enclosed within the body of the non-sexual generation, the male portion consisting of the pollen grain and the tube that grows out of it when the pollen grain germinates, the female portion consisting of a minute cellular structure within the embryo sac of the ovule. It is to be noted that no motile bodies are produced, as in the two preceding groups, and that the fertilization of the ovule results in the development of an embryonic plant called a seed, which is produced by none of the lower groups of plants. The *Spermatophyta* are divided into two groups, of which the lower is the *Gymnospermeæ*, including the cycads, the cone-bearing trees, and a few related families. In these the ovules are borne not in ovaries but naked among the floral bracts, and the sexual generation of the female is still comparatively complex before fertilization and bears considerable resemblance to that of some *Pteridophyta*. In the other group, the *Angiospermeæ*, the ovules are borne in ovaries, and only the simplest remnant of a sexual generation persists. In this group are the *Monocotyledones*, including the grasses, palms, lilies, orchids and their relatives, and the *Dicotyledones*, including the great majority of flower-

ing plants. The dicotyledonous and the gymnospermous plants were at one time classed as a group *Exogena*, in contradistinction to the group *Endogena*, which consisted of the monocotyledonous plants. This grouping of the flowering plants into exogens and endogens, however, is no longer maintained, it having been shown from embryological studies that the gymnosperms should stand next above the ferns. The old division of dicotyledonous plants into *Apetala*, *Gamopetala*, and *Polypetala* is also now discarded, the families included under *Apetala* appearing not to constitute a real group. They have therefore been interpolated among the families of the remaining two groups, most of them going with the *Polypetala*. All three of the old names have been abandoned, the name *Archichlamydeæ* being now used for the apetalous and polypetalous plants jointly, and the name *Sympetala* for the gamopetalous plants. The known species of plants as based on recent standard and conservative enumerations of the various large groups are approximately as follows:

<i>Myxophyta</i>	400
<i>Thallophyta</i>	59,000
<i>Bryophyta</i>	8,000
<i>Pteridophyta</i>	3,500
<i>Spermatophyta</i>	120,000
	<hr/> 190,900

Plants in Relation to Geology.—Plants play an important part in the configuration of the earth's surface by the prevention or retardation of erosion. This is accomplished by the direct binding action of roots on the soil, by obstructing the run-off of water as it filters through a layer of decaying vegetable matter, and by hindering the melting of snow under the shade of a forest cover. Wind erosion of sand or dust soils both on beaches and in arid regions is prevented chiefly by vegetation. In the building up of peat deposits, such as the sphagnum bogs of the Northern States, or the Dismal Swamp, Okefinokee Swamp, or the Everglades, plants are the principal factors. Deposits of coal and petroleum are of vegetable origin. The disintegration of rocks is hastened by the presence of living mosses and other plants. The fertility of soils is largely dependent on the admixture of decayed vegetable matter, or humus; and the so-called nitrifying organisms of the soil, which change nitrates, which can not be taken up as food by plants, to nitrites, which are readily absorbed, belong to a group of microscopic plants known as bacteria. A very important role in soil fertilization is played by a certain group of plants, the *Leguminosæ*, including the clovers, beans, and peas. One of the essentials of plant food is nitrogen. Ordinary plants have not the power to take free nitrogen from the air, where it exists in almost unlimited quantities, but absorb their nitrogen from certain nitrogenous substances in the soil. This element of soil fertility is soon exhausted. Leguminous plants, however, produce on their roots small tubercles containing bacteria which have the power to take free nitrogen from the air in the soil and put it into a form suitable for plant food. By the death and rotting of the plant the nitrogen thus absorbed from the air is incorporated in the soil and is available as food

BOTANY.



1. *Samuela*, and Vegetation of Western Texas.

2. Yellow Pine Forest of Oregon.

3. *Agave*, and Vegetation of Western Texas.

4. Tree Fern, and Vegetation of the Tropical Zone.

for all sorts of vegetation. In this way the leguminous plants are almost indispensable for the rehabilitation of soils worn out by excessive cropping.

Plants in Relation to Geography.—Most of the land surface of the earth is covered by a green mantle of vegetation, which varies in its makeup at different points in accordance with several factors, the most general of which in its variation is temperature. Certain areas of the north polar and south polar regions, permanently or almost permanently covered with snow or ice, and various similarly cold areas on mountains of higher and higher elevation in lower latitudes, are devoid of vegetation. Next to this is an area of sufficient warmth in summer to produce a vegetation of herbaceous plants and shrubs but devoid of trees—the arctic, antarctic, and alpine vegetation. Then come the temperate areas of the earth, characterized by a vegetative covering able to withstand freezing during a portion of the year, yet sufficiently warm to permit an abundant growth of trees. Next follows the tropical area, with a vegetation not subjected to frost and characterized especially by forests made up in part of palms. A factor of probably even greater importance, but more broken and restricted in its distribution, is moisture. The four great temperature categories outlined above are cross-hatched by moisture lines parallel with the lines of equal precipitation. With too little moisture forests can not exist, and we have plains and deserts of grass or brush. Neither do forests exist in a soil too persistently moist and poorly drained, and thus we have moors, bogs, natural meadows, and savannas. The extreme of moisture is reached in the plants called aquatics, growing either in fresh water or in the ocean, often wholly submerged.

Each of the other factors in plant growth, light, air, food, and the complex mechanical relations of the plant, varies greatly from one locality to another, and in their various combinations with different degrees of heat and moisture they furnish an almost endless variety of environments. Each of these combinations of conditions has its characteristic association of plants, which, adapted to the conditions, and to each other, form a community. The study of plants in their detailed relation to these local surroundings forms a branch of geographic botany known as plant ecology. North America furnishes a good series of geographic areas with sufficient climatic differences to necessitate different floras. The vegetation of the continent is divided by Merriam into the following zones: Arctic, Boreal, Transition, Upper Austral, Lower Austral, Tropical. The Arctic zone extends from northern Labrador northward across the northern edge of the continent to Bering Strait, dipping southward along the shores of Bering Sea to Bristol Bay, Alaska. The vegetation of this zone consists of herbaceous or of depressed woody plants, trees being absent. Over large areas, known as tundra, the ground is permanently frozen underneath, a few inches of the surface thawing each summer and permitting the growth, in a cold, wet soil, of an often luxuriant but low vegetation. The Arctic zone is represented southward as far as southern California and northern Arizona by certain alpine plants on the summits of mountains high enough to have a timber line, approximately 12,000 feet in that latitude. The Boreal zone, sometimes

subdivided into a northern, or Hudsonian, belt and a more southerly, or Canadian, belt, extends from the Arctic zone southward to a line traversing the northern part of New England, Ontario, Michigan, and Minnesota, jumping to the higher elevations of the Adirondack and Appalachian Mountain systems, then continuing westward across North Dakota and Assiniboia to British Columbia, dipping south in the higher elevations of the Rocky Mountains nearly to Mexico, in the Cascades and Sierra Nevada to southern California, and along the shores of the Pacific to northern California. The most characteristic feature of this zone is forests of spruce or balsam fir. The Transition zone covers most of New England, New York, Michigan, Minnesota, North Dakota, about half of South Dakota, and the southern part of Assiniboia, thence extending southward through the Plateau and Great Basin to Arizona, New Mexico, and California, in the southern parts of those States reaching down to an elevation of about 6,000 feet. The most characteristic tree of the eastern, humid part of this zone is the white pine; of the western, arid part, the yellow pine. The Upper Austral zone, as represented in the eastern United States by the so-called Carolinian flora, covers the lower Hudson valley, southern New Jersey, Delaware, eastern Maryland, the Piedmont section of the south Atlantic States, middle Tennessee and Kentucky, and most of Ohio, Indiana, Illinois, Iowa, and Missouri, northwestern Arkansas, southeastern South Dakota, and eastern Nebraska and Kansas. It is especially characterized by its forests of certain species of oak and hickory. The flora of the western part of this zone, known as the Upper Sonoran, covers the principal part of the arid western plains, from Washington and Montana southward through the Mexican plateau. The flora is devoid of trees and is commonly characterized by sagebrush or bunchgrass. The Lower Austral zone is divided, like the last, into an eastern humid and a western arid part. The eastern, containing the Austroriparian flora, covers the coastal plain from Chesapeake Bay to middle Texas, extending northward in the Mississippi valley to extreme southern Illinois and Indiana. One of the most characteristic wild plants is the cane, while cotton is the most conspicuous cultivated plant. In the arid region of western Texas, the great valleys of New Mexico, and the deserts of southwestern Arizona, southern Nevada, and southeastern California, lies the western part of the Lower Austral zone, containing the flora known as the Lower Sonoran, characterized especially by the creosote bush and the mesquite. This flora has large extensions into northern Mexico. The Tropical zone covers the lower third of the Florida peninsula, enters the extreme southern point of Texas, and on the Pacific coast reaches north on the east side of the Gulf of California to the lower Colorado and Gila rivers. From these northern extremes the tropical flora extends southward through Mexico, Central America, and the West Indies. Various genera and species of palms form the most conspicuous and characteristic features of this flora.

Plants in Their Economic Relation to Man.—Every savage race is intimately associated with the flora of its region. Having no means by which to supply the ordinary necessities of life through foreign trade, as do many civilized

BOTANY BAY — BOTHA

races, the savage has learned from necessity to know the precise qualities of the plants about him as foods, textiles, poisons, dyes, tans, fuels, etc. In connection with the making of a single aboriginal instrument, such as a bow or a fire-drill and block, there is required on the part of the savage a knowledge of the strength, elasticity, texture, and other qualities of all the kinds of wood occurring in the range of his travels, such as is not possessed by one person in a thousand among highly civilized races. The economic value of a correct and discriminating record of the uses of plants among aboriginal peoples is evident. The influence of a familiar flora in attracting a savage race to a wider geographic range or that of a strange flora in limiting migration in any direction is a natural outcome of the savage's exact knowledge of the plants of his native region. The practice of some of the migratory races of prehistoric man to transport their cultivated plants with them has resulted in the wide extension of these plants from the regions they naturally occupied. From this association it turns out that a critical study of the origin and distribution of the plants cultivated by aboriginal races throws important light on their prehistoric migrations. Some of these botanical facts appear to be of very great antiquity, perhaps even antedating those furnished by aboriginal arts or by language. This study of the relation of primitive man to his plant environment is called ethnobotany, or aboriginal botany. Some of the processes of plant life are important to man as being fundamental to his existence. The plant is an engine which through the energy furnished by sunlight is capable of transforming inorganic substances into organic compounds, without which animal life could not exist. The ordinary economic relations of plants to civilized man are many, and enter as important factors into such arts and industries as agriculture, horticulture, medicine, manufacture, and commerce. The production and elaboration of plant products and their transportation from those parts of the world in which they can be and are produced to other parts in which they are needed occupies probably the largest part of the energies of the human race.

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Botany Bay, New South Wales, Australia, so called by Capt. Cook on account of the many strange plants found growing here. Cook landed in Botany Bay on his first voyage in 1770, and took possession of the country in the name of his sovereign. The penal settlement, founded in 1788, and popularly known by the name of Botany Bay, was established on Port Jackson, where the city of Sydney now stands.

Botany Bay Gum, a gum resin produced by the *Xanthorrhæa hastilis*, or *resinifera*, of Australia.

Botargo, a relish made of the salted roe of the mullet or tunny, used on the Mediterranean coasts.

Botetourt, Norborne Berkeley, a conspicuous actor in American colonial history: b. England, 1734 (?); d. Williamsburg, Va., 15 Oct. 1770. He was the descendant of John Berkeley, the cavalier, who was ennobled by Charles II. in 1660. He was sent to Virginia as royal governor in 1768, just eight years before the Declaration of Independence. He had full instructions from the Crown and remonstrations to assume more dignity than had been the wont of colonial governors, and accordingly he paraded the streets of Williamsburg with guards, a coach, and other requisites of vice-regal pomp. Conflicting duties to the king and the people made his situation most unpleasant. In 1769 the assembly took into consideration the incipient troubles with England, and on 16 May passed firm but respectful resolutions remonstrating against parliamentary taxation and the right claimed to send them to England for trial. So firm were they that Lord Botetourt summoned the speaker and burgesses before him and dissolved them. The result was that a convention met in a private house and took the incipient steps for the revolution. The convention did not attempt to legislate, but simply remonstrated with Parliament, sending its resolutions to the other colonies and to England. Under the influence of these resolutions Lord Hillsborough wrote a letter to Lord Botetourt, assuring him that it was not the intention of government to tax the colonies, and that the obnoxious imposts would be withdrawn, which letter Lord Botetourt communicated to the assembly. All these anticipations, however, were destroyed by the policy of Lord North, who succeeded Charles Townsend, and the promise was not fulfilled in full, the duty on tea being retained. Botetourt was deeply mortified, and soon died of disease aggravated by mental suffering. He was deplored by men of all classes in the colony, and the legislature erected a marble statue to his memory, which is still standing in the college of William and Mary.

Both, John and Andrew, two Flemish painters, were born at Utrecht about the year 1610, Andrew being the younger. They were the sons of a glass painter, who instructed them in the rudiments of drawing. They afterward made further progress in the school of Abraham Bloemaert, and went at an early age together to France and Italy. John, attracted by the works of Claude Lorraine, chose him for his model; Andrew preferred the painting of the human figure, and imitated the style of Bamboccio. But although their inclinations led them in different directions, their fraternal affection often united their talents in the same works. Thus Andrew painted the figures in the landscapes of his brother; and their labors harmonized so well, that their pictures could not be suspected of coming from different hands. The ease and fine coloring in the beautiful figures of John cannot be overlooked in spite of the excess of yellow sometimes found in them. Andrew was drowned at Venice in 1650. John, inconsolable for his loss, abandoned Italy, and returned to Utrecht, where he died shortly after.

Botha, Christian, Boer commander: b. the Transvaal; d. Kokstad, Griqualand West, 8

BOTHIA — BOTOCDOS

Oct. 1902. At the opening of the Boer war in 1899 he led a commando into Natal and was active in the siege of Ladysmith and at the defense of the Tugela crossing. After the relief of Ladysmith, he retreated to Laing's Neck, where he was left by his brother, Louis Botha, in command of the Boer forces. By opening negotiations with Gen. Buller he delayed that general's advance for several days, and after the fall of Pretoria he was placed in command of all the Boer forces in the southeastern Transvaal. His frequent raids into Zululand effected the diversion that allowed Gens. Louis Botha and De Wet to continue the war.

Botha, Louis, Boer soldier: b. Greytown, Natal, about 1864. He began life as a farmer, and, as a young man, had a share in the establishment of the Transvaal Republic. Later he fought in the Kafir campaign. He was elected to the Volksraad at Pretoria. Upon the outbreak of the Boer war with England in 1899 he was given a subordinate command, and upon the death of Gen. Joubert in March 1900 he became commander-in-chief of the Boer forces, gaining victories at Spion Kop and Colenso. In 1906 he became Prime Minister of Pretoria.

Bothie (Gael. *bothag*, a cot), a house, usually of one room, for the accommodation of a number of work people engaged in the same employment; especially, a house of this kind in parts of Scotland, in which a number of unmarried male or female farm servants or laborers are lodged in connection with a farm. Bothies are most common in the northeast of Scotland, and are chiefly for the accommodation of unmarried male farm servants engaged on the larger farms, who as a rule have to do their cooking and keep the bothie in order for themselves. The bothie system has often been condemned.

Bothnia, the name formerly given to a country of northern Europe, extending along the east and west shores of the Gulf of Bothnia, the east portion now being comprised in Finland, and the west in Sweden.

Bothnia, Gulf of, the northern part of the Baltic Sea, which separates Sweden from Finland. It commences at the island of Åland, lat. 60° N., and extends to 66°; its length is about 450 miles, its breadth from 90 to 130, and its depth usually from 20 to 50 fathoms. As its water contains little salt, it freezes over in the winter, so as to be passed by sledges and carriages. It abounds in salmon and other fish, and also in seals.

Bothriocephalus, a genus of cestoid worms which is found very abundantly in the intestines of predaceous fishes, and one species of which is sometimes found in the intestinal canal of man. It belongs to the same family as the tapeworm (*Tænia solium*), but it is distinguished from it by having its segments broader than they are long; by wanting the four disks which surround the head of the tapeworm, and having in their place two lateral longitudinal openings; and thirdly, by having the sexual organs on one of the flat surfaces of each segment instead of at the edges of the segments. The two longitudinal openings (whence the worm receives its name, from *bothrion*, a little pit, and *kephale*, the head) do not seem to be organs of nutrition, but merely a kind of suckers by which

the worm is enabled to attach itself to the intestines of the animal which it infests, while it is nourished by absorption throughout its whole length. Although, as already stated, this worm generally infests the bodies of predaceous fishes, it is capable of being transmitted to all vertebrate animals, and especially it is found in those birds which live upon fish. The only species which is found in the intestines of man is the *Bothriocephalus latus*, and it is rare to find even this species except among the inhabitants of two distinct parts of Europe, the north and the centre. It is found, on the one hand, in Russia, in Norway, and in Sweden, and on the other hand, in Switzerland, the north of Italy, some provinces of Germany, and some departments of France, but rarely elsewhere. It has been remarked that this worm is common where the *Tænia* or true tapeworm is rare, and *vice versa*. It is rare in the United States, but with the increase of emigration from the regions of Europe, where it abounds, its appearance may be looked for.

Bothwell, James Hepburn, Earl of, is known in Scottish history by his marriage to Queen Mary. He was the only son of the third earl: b. about 1536; d. 1578. He succeeded his father in 1556, thus obtaining important offices and estates, and by 1566 he had attained to high favor with the queen. The plot by which Darnley lost his life in 1567 was of his contrivance, and the queen was suspected of conniving at it. Bothwell was charged with the crime and underwent a mock trial, being of course acquitted. After the death of Darnley he seized the queen near Edinburgh, and carrying her a prisoner to Dunbar Castle, prevailed upon her to marry him. Before this he had divorced his own wife, Jean Gordon, sister of the Earl of Huntly. Though seemingly secure in the possession of power, and though created Duke of Orkney by the unfortunate queen, he soon found that his conduct had roused the indignation of the kingdom. A confederacy was formed against him by the barons, the queen was liberated from his power, and he escaped to the Orkneys, and afterward to Norway. The Danish authorities kept him imprisoned for some time at Malmö, latterly at Drangholm in Zealand, where he died insane. See the various histories of Scotland, and the 'Life of Bothwell' by Prof. Schiern (English translation 1880).

Bothwell, Scotland, a village of Lanarkshire, on the north bank of the Clyde. It is situated eight miles east of Glasgow, and about one mile beyond it stands Bothwell bridge, where a decisive battle was fought in 1679 between the Scottish Covenanters, commanded principally by their clergy, and the royal forces, commanded by the Duke of Monmouth, in which the former were totally routed. Near the village are the fine ruins of Bothwell Castle, once a stronghold of the Douglases.

Botocdos, or **Aymeres**, a Brazilian race of Indians. They live 70 to 90 miles from the Atlantic, in the virgin forests of the coast range (Serra do Mar or Serra dos Aymeres), on the borders of the forests of Minas-Geraes and Espírito-Santo, especially on the Rio Doce. They receive their name from the custom which they have of cutting a slit in their under lip and in the lobes of their ears, and inserting in these, by way of ornament, pieces of wood shaped like

BOTRYCHUM — BOTTARI

the bung of a barrel (Portuguese *botoque*). They have oblique eyes and projecting cheekbones. Their color is a dirty brown. They go quite naked, and paint their bodies, and a Botocudo warrior with his lip and ear plugs, his body painted black and red, and his face bright red, strongly reminds one of a denizen of the infernal regions. They are very skilful with the bow and arrow, and live chiefly by hunting. They now number only a few thousands, and are decreasing.

Botrychium, a genus of fern (adder's-tongue), of the sub-order *Osmundea* and tribe *Ophioglossae*, characterized by its distinct *theca* in a compound spike attached to a pinnate or bipinnate frond. The common American species are: *B. lunaria*, common moonwort, which grows on elevated lands and pastures where other ferns are seldom found. It was once supposed to possess great virtues, both magical and medicinal, and was carefully gathered by the light of the moon. *B. virginicum*, the largest of the species, is known by the name of rattlesnake fern, from growing in places frequented by that dangerous reptile.

Botrytis, a genus of fungi belonging to the section *Hypomycetes*, and familiar by name to cultivators from its connection with the potato disease. The genus contains a number of those minute plants known as molds and mildews, and of these some have the peculiar habit of growing in the tissues of living vegetables. The threads of which their growth consists creep among the loose cells of the under side of leaves, and send up their fertile shoots through the stomata. Many kinds of *Botrytis* are extremely destructive to various plants. Whole crops of onions are soon destroyed by one species; legumes suffer from another, but in a less degree; and a third species is sometimes injurious to turnips. The decay of the leaves and stem in the potato disease is now charged against *Phytophthora infestans*, but old writers attributed the trouble to *B. infestans*. Though extremely injurious to the farmer these molds are sometimes very serviceable by destroying weeds. Various agricultural pests may often be seen looking yellow and unhealthy, when an examination of the under side of the leaves will show that this is owing to the ravages of these minute parasites.

Botta, Anne Charlotte Lynch, American author: b. Bennington, Vt., 1820; d. 28 March 1891. She was educated in Albany, N. Y.; began her literary career in Providence, R. I., and, removing to New York, married Prof. Vincenzo Botta, in 1855. From the time of her marriage to her death, her house was a favorite centre of literary and art circles. Her publications included a collection of poems, many essays, reviews and criticisms, and 'A Handbook of Universal Literature.' She was a sculptor of much merit, and was influential in promoting the establishment of Barnard College for Women.

Botta, Carlo Giuseppe Guglielmo, Italian statesman, historian, and poet: b. San Giorgio del Canavese in Piedmont, 6 Nov. 1766; d. Paris, 10 Aug. 1837. During the time of the French Revolution he was a student of medicine at Turin, and adopting revolutionary opinions with enthusiasm, he suffered for his zeal by 'two years' imprisonment (1792-4). After pass-

ing as a physician he entered the French service, and accompanied the expedition which Napoleon sent to Corfu, and he was soon after elected as a member of the provisional government of Piedmont. When this territory was, in 1803, annexed to the French empire, Botta was elected a member of the Corps Législatif, where his behavior was characterized by a bold opposition to the emperor. During the 'Hundred Days' he was rector of the academy at Nancy, and after the second return of the Bourbons he went in a like capacity to Rouen. The greater part of the remainder of his life was passed by him as a private gentleman at Paris. His chief works belong to the department of history. Among these are: 'Storia della Guerra dell' indipendenza degli Stati Uniti d'America'; 'Storia d'Italia dal 1789 al 1814' (10 vols.). He also furnished a continuation to Guicciardini's Italian History from 1490-1534, bringing it down to 1789.

Botta, Paul Emile, French traveler and archaeologist: b. about the beginning of the 19th century; d. Poissy, April 1870. He was a son of Carlo Giuseppe Botta (q.v.). While still very young he made a voyage round the world, traversed the western portion of America, and took part as physician to Mehemed Ali in an expedition which set out from Egypt to Sennaar, of which he took advantage to make a considerable zoological collection. At a later period he was appointed French consul at Alexandria, and from this place he undertook a journey to Arabia in 1837, the scientific results of which he communicated to the world in his 'Relation d'un Voyage dans l'Yémen.' His chief service to science consists in his having discovered the ruins of ancient Nineveh, a discovery made by him in 1843 in the course of excavations in the neighborhood of Mosul, which he conducted with great energy and ability while acting as consular agent for the French government at that town. As the result of investigations made upon the spot he published two important works, one on the cuneiform writing of the Assyrians, 'Mémoire de l'Écriture Cunéiforme Assyrienne,' and the other upon the monuments of Nineveh, 'Monuments de Ninive' (5 vols. folio, with drawings by Flandin, Paris). The latter is a work of great splendor, and marks an era in Assyrian antiquities. From 1847 to 1857 Botta lived as French consul-general in Jerusalem, and from 1857 to the end of his life in the same capacity at Tripoli.

Botta, Vincenzo, Italian scholar: b. in Piedmont, 11 Nov. 1818; d. 5 Oct. 1894. He was elected to the Sardinian parliament in 1849. In 1853 he settled in the United States and was appointed professor of the Italian language and literature in the University of New York. He published 'Dante,' 'Modern Philosophy in Italy,' and other studies.

Bottari, Giovanni Gaetano, Roman Catholic prelate: b. Florence, 1689; d. 1775. After completing his studies he was admitted a member of the Academy della Crusca, and entrusted with the preparation of the celebrated dictionary of that body. He labored for six years on this work, which was published in 6 volumes folio. The ability which he displayed in it induced the Duke of Tuscany to give him the management of the grand-ducal printing office. He left Florence in 1730 and settled in Rome, where



BOTTICELLI.
Nymph and Centaur.

Pope Clement XII. appointed him professor of ecclesiastical history and polemics in the Collegio della Sapienza; the same year he was appointed palatine prelate. Shortly after he was employed with the geometer Manfredi in examining the course of the Tiber from Perugia to the mouth of the Nova, with the view of rendering it navigable, and providing a remedy against its devastating inundations. The excellent report on the subject, though signed by Manfredi, is said to have been drawn up by Bottari. As a compensation for the performance of this task, the Pope appointed him keeper of the Vatican library. After living under several Popes, all of whom treated him with favor, he died at the age of 86. His works, in addition to those already mentioned, are partly original and partly corrected editions of celebrated writings previously published. Among the former are 'Lectures on Boccaccio, Livy, and Dante'; among the latter is a splendid edition of Virgil, with a learned preface and notes, and a corrected edition of Vasari's 'Lives of the Painters.'

Bottesini, Giovanni, Italian musician: b. Crema, Italy, 24 Dec. 1822; d. 7 July 1889. He was taught the double-bass in Milan, by Luigi Rossi, according to the method of Andreoli and Dragonetti, and soon became a first rate performer; meanwhile studying musical composition under several distinguished masters. When scarcely 23, he was engaged as contrabassist for the Italian opera in Havana, where in a few seasons he rose to the post of *maestro* and musical director of the company. Here he produced in 1846 his first opera, 'Cristoforo Colombo.' During the five years of his stay in Havana, he paid occasional visits to the United States, where he secured considerable fame by his wonderful performances in the concert room. His masterly handling of the huge instrument took everybody by surprise, while his style, at once elegant and impressive, won the admiration of all critics and amateurs. His success on his return to Europe in 1851 was not less complete; the concerts he gave in London and Paris established his reputation as the first living contrabassist. In 1853 he returned to the United States with M. Jullien, and afterward accompanied Madame Sontag to Mexico. Subsequently he became director of the orchestra at the Italian opera in Paris, where his opera 'L'Assedio di Firenze' was successfully performed during the spring of 1856. Other works are: 'Ali Baba' (1871); 'Ero e Leandro' (1879); 'Garden of Olivet' (1887), an oratorio. He also published numerous overtures, symphonies, and quartettes.

Böttger, or Böttcher, also written **Böttiger**, **Johann Friedrich**: b. Schleitz about 1681; d. Dresden 13 March 1719. He was a Saxon alchemist whose pretended discovery of the philosopher's stone resulted in the useful invention of Saxon porcelain. After various vicissitudes he handed over to King Augustus II. an account of his discovery, which is still preserved in the archives of Saxony. The king, however, not availing himself of his suggestions, they were put in application by Count Tschirnhausen, who established a manufactory at Weissen in 1705; employing Böttger, who succeeded in producing of the reddish-brown clay which abounds in the vicinity of Weissen a porcelain of remarkable beauty and solidity.

Botticelli, Alessandro Filipepi, *à-tès-sân'-drò fil-i-pä'pè bôt-te-chèl'lè*, Italian painter of distinction commonly called Sandro Botticelli: b. Florence 1447; d. there, 17 May 1510 or 1515. His name is derived from that of Botticello, his first master, a goldsmith, from whom he acquired his knowledge of gold afterward made useful by his employment of it in foliage, hair, and embroidered tissues. He subsequently became one of the most distinguished pupils of Filippo Lippi, the Carmelite, and is reckoned the richest and most fanciful colorist of the Florentine school. He excelled both in devotional and mythological subjects and was an admirable painter of flowers. He was employed by the most influential art patrons of his time, including Lorenzo de Medici. About 1481 he was commissioned by Sixtus IV. to paint the walls of the Sistine Chapel; three of the frescoes there are his work: 'The Life of Moses'; 'The Temptation of Christ'; 'The Punishment of Korah, Dathan, and Abiram,' and several of the portraits of the Popes. He became an ardent follower of Savonarola, and is said latterly to have neglected his art and suffered many privations. He is said to be one of the engravers of a celebrated series of illustrations executed by Florentine artists toward the close of the 15th century, notably a set of designs for the 'Divina Commedia' of Dante, of which 686 are in the Berlin Museum. His works are to be found in various European galleries, his Madonnas being especially characteristic of his style. In these the Virgin appears peculiarly slender and with a melancholy expression as if oppressed by forebodings. He was greatly esteemed by his contemporaries, but subsequently fell into disfavor. Although opinions as to his merits differ widely, Botticelli is to-day very popular and forms the theme of much art discussion. See Ulmann, 'Sandro Botticelli' (1893); Pater, 'Studies in the History of the Renaissance' (1873); Phillimore, 'Botticelli' (1894); Berenson, 'Florentine Painters of the Renaissance' (1898); Supino, 'Sandro Botticelli' (1900); Steinman, 'Botticelli' (English translation 1901).

Böttger, Karl August, German writer, particularly distinguished as an archæologist: b. Reichenbach, Saxony, 8 June 1760; d. Dresden, 17 Nov. 1835. After a philological course at Leipsic, he became in the first place a private tutor at Dresden, and then successively headmaster of a school at Guben, and another at Bautzen. In 1791, through the influence of Herder, he became director of the gymnasium at Weimar, and it was here that, while he enjoyed the society of Goethe, Schiller, Wieland, and other distinguished men, he began his fruitful literary career. In 1804 he removed to Dresden, where he devoted himself exclusively to archæology. Ten years later he was appointed chief inspector of the Museum of Antiquities in that city, where he continued to reside to the end of his life. In 1832 he became a member of the French Institute. Among his most important works are: 'Sabina, or Morning Scenes of a Wealthy Roman Lady'; 'Griechische Vasengemälde' ('Paintings on Greek Vases'); 'Thoughts on the Archæology of Painting'; 'Mythology of Art'; 'Lectures and Essays on Archæology'; 'Amalthea' (3 vols.).

BOTTLE—BOTTLING

Bottle, a vessel designed to hold liquids, constructed of various materials and in various forms according to the necessities of local manufacture and the demands of the kind of liquid to be enclosed. It is now understood to mean a vessel made of glass, with a more or less narrow neck and mouth. In ancient times, however, the bottle was nothing more than a skin of some animal. Thus the Biblical aphorism concerning the putting of new wine into old bottles as an illustration of folly means that it would not be wise to trust a new wine, while yet active with fermentation, to the chance of bursting a leathern vessel necessarily weakened by use and age. In Spain, Turkey, India, and some parts of South America to this day, various skins, and especially that of the goat, are used for containing wine and water. The hide is stripped from the animal as entire as possible, and the various natural openings having been sewed up, with the exception of that of one of the legs, which is retained as a nozzle, the vessel is ready, after a certain preliminary curing of the skin, for the reception of the wine. The peculiar taste of Amontillado sherry is supposed to be owing to the fact of its being kept in leather. The ordinary bottle is, however, of glass. The various bottles used for different well-known purposes are generally distinguished by peculiar shapes and sizes, as, for example, the English wine, beer, ale, and soda bottles, the French champagne, Burgundy, and claret, and the Rhenish wine bottles. Port wine is occasionally put into very large bottles, called magnums, and acids in still larger ones termed tarboys.

Bottle Charts, maps of the terminal points of the voyages of sealed bottles thrown into the sea, and either drifting to land or picked up afloat. These bottles had long been used by the victims of ship-wreck to convey messages or record their fate, or by travelers or seamen for joke or experiment; but the first serious note taken of them was by Lieut. Becher of the British navy, who in 1843 published in the 'Nautical Magazine' a Mercator chart of the Atlantic coast from lat. 6° S. to 63° N., or say from Cape St. Roque, in Brazil, to Hudson Strait, with straight lines from start to finish of a number of bottle voyages he had noted, the length of these lines, time elapsed since set afloat, etc. Of course some bottles leak and founder and others are crushed; but he was able to collect 119 bottles, one of which had traveled 3,900 miles in a straight line, and of course far more in fact, and 4 over 2,000, while the time of voyage varied from 3 days to 16 years. This chart has been repeatedly freshened up with new facts, re-engraved, and republished in the 'Nautical Magazine.' Later, several government departments, of which the United States Hydrographic Office is far the chief, have used this method systematically for the study of ocean currents. The office furnishes shipmasters with papers for inclusion in bottles, containing requests in several different languages for their delivery, with date and circumstances of finding, to the nearest United States consul, who will forward them to Washington. By this means three or four hundred new bottle voyages have been registered, with curious results. In general, their track is remarkably uniform, given the same local conditions. Of two bottles thrown out from the

Blonde within five days in 1826 (one of Becher's list), one was picked up 14 and the other 16 years after at the same spot on the French coast. Yet the effect of local winds is so great that of two set afloat simultaneously at the same spot, one was picked up on the Shetlands, the other on the west coast of France. Just north of the Azores, the surface conditions are so variable that of five bottles thrown out in one summer within 100 square miles, one drifted to the coast of Norway, two to the west coast of Ireland, one to France, and one to Spain. The longest recorded voyage was about 8,500 miles, from the Allertons, south of the Falkland Islands, to the shore of the great Australian Bight, in a little less than three years. See CHART; MAP.

Bottle-gourd. See CALABASH.

Bottle-tree, a medium-sized Australian tree (*Sterculia rupestris*) of the natural order *Sterculiaceae*. From the top of the globular stem, as from the mouth of a bottle, the branches extend. They bear lanceolate leaves two to four inches long, and axillary panicles of inconspicuous flowers followed by leathery six-seeded follicles. The soft brittle wood is of little economic value, but the stems are said to contain much water, which is frequently obtained by the natives and by travelers. Some other allied species, also called bottle-tree, furnish edible mucilaginous roots which are largely used by the aborigines.

Bottlenose, or **Bottlehead**, a small Arctic and North Atlantic whale (*Hyperoodon rostratus*) closely allied to the sperm whale, and so called from the dolphin-like shape of its head or snout, where the two pointed teeth are in the lower jaw. Placed farther back than ordinarily, and in smaller proportion, is a dorsal fin; the skin is smooth, and glossy, lead-colored on the back, graduating into white on the belly. These whales travel in small bands, generally keeping just south of the Arctic ice, and moving northward during the breeding season. They feed mainly on deep-water squids, for which they dive to great depths. Their chief value lies in the amount of oil and spermaceti that they yield.

Botting, the process of enclosing liquids in bottles; including the operation of stopping or corking. The use of bottles for retaining liquids involves three requisites: that they shall be clean enough not to injure the purity, taste, or looks of the contents, or the looks of the bottle, or to cause chemical action which will do so; shall be strong enough to resist the probable pressure; and shall have stoppers which will not be disintegrated or corroded, and will be tight enough not to let air in or volatile substances out, the degree of such precaution varying with the liquid. For scientific preparations, which includes chemical analysis in criminal cases, an indispensable condition is that the bottle shall contain no impurities which would cast doubt on the result; hence chemists in such cases use only new bottles, cleanse them thoroughly with some preparation to remove external substances, and expose them to a red heat before using. For common household use, as there is no bottling under pressure, the kind or weight of glass is of no importance. For cleaning, it is best to shake up with warm water and caustic soda and clean with a bottle-

BOTTOMRY — BOTTOMRY

brush; to clean out gummy residues like paraffine from naphtha and gasoline bottles, shake up with sulphuric acid.

The material of the stopper is of the first importance. For scientific use, only glass is possible; as also to retain corrosive acids, and perfumes that would pass through the pores of a cork, in which latter case also nice taste as well as security is a desideratum. In general family use, for volatile fluids like gasoline and naphtha, and ammonia which might soak up and disintegrate the cork and let its gas escape, rubber is the usual stopper. In commercial bottling on a large scale, of beer, wine, mineral waters, and carbonated beverages generally, the only stoppers used are cork and rubber, except in the case of siphons with valves. For wine, the old-fashioned long cork, driven deep in and pulled with a corkscrew, still holds the field. The common stopper for "soft" drinks, and in part for beer, is a "terraced" rubber one fastened to the under side of an iron cap, and attached to the neck of the bottle by a wire loop whose leverage forces the rubber tightly into the mouth of it, and can be easily thrown off and the stopper removed. But in the United States, for beer even the rubber stopper is rapidly being displaced by a patent cork made in Baltimore, consisting of a crimped metal cap lined with cork, which a machine tightens around the neck of the bottle. It is easily lifted off by an iron ring, thrown over the neck and pulled up by a short handle; is much cheaper than the permanent rubber, and nearly as handy; and is cleaner, as good houses use only new ones. Indeed the use of old corks recleaned belongs to a low grade of goods. For milk bottles and others of which the corks are to last but a few hours, and need no strength, pasteboard or wood-pulp are much used.

Old bottles, however, are used over and over; and here thorough cleanliness is a prime requisite, both for salability and because dregs of old liquor might ferment and ruin the new. If any corks have been driven in, they are extracted by machinery; for the rest, in the large establishments, the bottles are placed in rows of pockets on the surface of a large drum, which their weight, as the upper rows are added and the emerging ones taken off, causes to revolve slowly through a vat of hot solution of caustic soda, which enters the open mouths and eats out the sticky remnants of the last filling. They are then taken out and placed by sets, inverted, in a frame over revolving brushes, now consisting almost entirely of two or three rubber prongs held apart by strings or centrifugal force,—the old bristle brushes being disused because they wear out and leave bristles in the bottles,—at a speed of from 2,500 to 3,000 times a minute; then rinsed in frames of from two to four dozen vertical sprinkling tubes, over which the bottles are set, and jets of hot water forced into them. The filling is done by siphonage, or air or gas pressure. A simple form for small breweries is an open trough filled from a barrel, and supplying several siphon tubes which the operator starts by sucking them, shifting the bottles as fast as filled; the siphon is tilted up by the weight of the bottle enough to give a flow, and the liquid in the trough is kept at a constant level by a float. But in the larger ones, a row of barrels or hogsheads is drawn upon by a set of rubber pipes with stop-cocks, to which the bot-

tles are held and filled by means of air or gas pressure, one pipe having several branches. With carbonated beverages there is danger of the bottles bursting, and they are filled in iron cages open only at the top, to protect the workmen; with heavily charged waters in siphons, the latter are of tougher glass and are tested beforehand, and the men sometimes wear rubber coverings for face, hands, or body. With flavored or sweetened drinks, the sirup is fed into the bottle from one spout while the carbonated water comes from another; in small works, however, the sirup is put in first and the bottle filled right-side up.

The recrimping of patent corks has been described; the old-fashioned long corks are shaped by a compressor and driven into the bottles by a plunger, operated either by hand or foot, or a self-feeder which can do 2,000 an hour. The corks are previously thrown into a hollow revolving drum for several hours, to rub against and batter each other, which knocks off the loose chips and shakes out the dust; then soaked and rinsed. There are wiring machines for either the small wires over the long corks, or the hinged wires with the rubber stoppers. The bottles when filled and corked are labeled by a machine, usually the bottles being laid in a crib with expansible sides, and a plunger forcing them down against the label, which at the same time is picked up and moved under the bottle across a paste roll; sometimes the label is pressed against the bottle. The speed of this process is practically limited only by the ability of the workman to feed bottles to the machine. A special label is sometimes fitted over the cork, for security against refilling the bottles of a reputed firm with inferior liquors. Sometimes the corks have a stamp or brand burnt into them with a hot die pressed down by a machine. Finally, the corks are often covered with tin-foil or caps of some kind; the former is done by hand.

Much capital is invested in this business, and there is a national association composed of manufacturers. Returns are made by nearly all these firms and companies to the association, from which it appears that this industry employs nearly 30,000 persons; it serves 4,489,038 customers, owns 22,940 horses, employs a capital of nearly \$51,000,000, and owns bottles to the value of \$12,747,633. Its loss of bottles annually is \$3,522,804. In this line are consumed annually, besides bottles, corks in great number, wire, patented arrangements for closing bottles, paper boxes for holding bottles, sealing wax, and labels. The cost of these materials is given at \$7,937,001. The capacity of corking-machines reaches 2,000 bottles per hour; that of labelling-machines 12,000 bottles daily.

Bottomry is the hypothecation or pledge of a vessel for the payment of a debt. The creditor has no right to take possession of the ship until the expiration of the time for which the loan is made, and then (under a bottomry contract in the usual form) only by the intervention of an admiralty court. If the loan is not repaid at the stipulated time, the lender applies to an admiralty court, which (the truth of the claim being established) decrees a sale of the ship to satisfy the debt. The conditions of such a contract usually are that, if the ship is not lost or destroyed by those risks which the

lender agrees to run, the debt is to become absolute. The risks assumed by the lender are usually the same as are enumerated in a common policy of insurance. If the ship is wholly lost in consequence of these risks, the lender loses his loan. In case of a partial damage, the bottomry bond usually provides that this damage shall be borne by the lender in the proportion of the amount loaned to the value of the ship. If this amount is equal to half the value of the ship, the lender is to bear half the amount of such loss, etc. As the lender thus assumes a certain risk he is justly entitled to a greater interest than if he did not thus take the hazard of the loss of the whole loan; and this is called "marine interest." He is entitled to the usual rate of interest on his loan, in addition to the usual premium of insurance for the same voyage or period. The stipulation for such a rate of marine interest is not a violation of the laws against usury, for it is not merely a compensation for the use of the money lent, but also for the risk assumed. The ship-owner may borrow money on bottomry whether his vessel be in port or at sea. But the captain of the ship, as such, cannot so borrow when in the port where the owner resides, or near enough to consult him on any emergency. In any other port he may pledge the ship on bottomry for the purpose of raising money necessary for repairing, supplying, and navigating her, if he can obtain it in no other way. If he borrow thus without necessity the bond is void, and the lender can look only to the personal responsibility of the captain.

Botts, John Minor, American legislator: b. Dumfries, Va., 16 Sept. 1802; d. Culpeper, Va., 7 Jan. 1869. He studied law and in 1833 entered the Virginia legislature. He was elected to Congress in 1839 and was frequently re-elected. Upon the outbreak of the Civil War he asserted his devotion to the Union, and in 1862 he suffered imprisonment on that account. After the war he published 'The Great Rebellion, Its Secret History, Rise, Progress, and Disastrous Failure'; was one of Jefferson Davis' bondsmen; and attended the Convention of Southern Loyalists in Philadelphia.

Botulism, bôt'û-lîsm, a form of poisoning due to the eating of tainted sausages, ham, head-cheese, or other impure meats. As a rule a certain stage of decomposition has taken place in the meat. Bacteria are abundant and generate toxins, some of which are responsible for the symptoms, which are those of acute gastrointestinal irritation. There is usually a period of from 12 to 24 hours (even 48 hours) after the eating of the meat before symptoms develop. The symptoms are various; there may be intense muscular weakness, with sudden nausea and vomiting; chills, small rapid pulse, cold extremities, headache, and pain are also present. Following the chilly sensations the temperature may rise, even to 103° or 104° F. Cramps, delirium, hallucinations, diarrhoea, and intense prostration may also be present. In some sudden and severe cases death has resulted with cholera-like symptoms. Recovery is very protracted. Many of the cases resemble internal hemorrhage, and great difficulty sometimes exists in the diagnosis. There are, however, more intestinal symptoms as a rule in meat poisoning (ptomaine poisoning). Abstaining from

all tainted meats is the sole preventive. See POISONS.

Boturini Benaduci, bôt-û-rē'nē bā-nā-doo'-chē, **Lorenzo**, Italian antiquarian: b. Milan about 1702; d. Madrid about 1750. In 1736 he went to Mexico and traveled there among the Indians, collecting a large number of their writings and valuable Spanish records; these finally came into the possession of the Mexican government and have been mostly lost or destroyed. He afterward lived in Spain, where he held the office of historiographer for the Indies. He wrote 'Idea de Una Nueva Historia de America.'

Botzen, or **Bolzano**, bôl-tzā'nô, Austria, a town in the Tyrol, 54 miles south of Innsbruck, at the confluence of the Talfer with the Eisack. It is a well-built, flourishing town, surrounded by a wall two miles in length, built to protect it from a mountain torrent close by. The parish church is a Gothic building of the 14th century, with an elegant spire; adjoining it is the new cemetery. The other objects worthy of notice are: the church of St. Nicholas, a gymnasium, custom-house, two monasteries, a normal school, and a nunnery. It has some silk and woolen manufactures, tanneries, dye-works, etc. Botzen has an important transit trade, and has four annual fairs, resorted to by commercial travelers from all parts of Italy and Germany. In the environs wine and fruits are produced. Pop. about 12,000.

Bouch, bowch, **Sir Thomas**, English civil engineer: b. Thursley, Cumberland, 22 Feb. 1822; d. Moffat, 30 May 1880. He was early attracted to engineering studies, and in 1839 began his apprenticeship to a civil engineer in the north of England. He was a resident engineer on the Stockton & D. Ry. for a period of four years, and in 1849 went to Scotland as manager and engineer of the Edinburgh & Northern Ry. While in the service of this company he devised a sort of floating railway for carrying goods trains across such estuaries as those of the Forth and Tay. After this he was for a time engaged in railway construction in England. He was engineer of the first railway bridge across the Tay, which was completed in September 1877, and opened in May of the following year. For this he received the freedom of Dundee, and in 1879 the honor of knighthood. On 28 December of that year the bridge gave way during a stormy night, while a train with some 70 passengers was crossing. All were drowned, and the accident caused such severe mental distress to Sir Thomas Bouch that it undoubtedly hastened his death.

Bouchardon, Edmé, éd-mā boosh-âr-dôû, French sculptor: b. Chaumont-en-Bassigny, 1698; d. Paris, 27 July 1762. In order to devote himself to statuary he went to Paris and entered the school of the younger Coustou. He soon gained the highest prize, and was made royal pensioner at Rome. The Duke d'Antin recalled him to Paris and gave him a studio at the Louvre. He assisted in repairing the fountain of Neptune at Versailles, and executed to statues which adorn the church of St. Sulpice. The fountain in the Rue de Grenelle, which the city of Paris ordered to be constructed in 1739, was made by him, and is considered his masterpiece. The execution of the greatest monument of that period, the equestrian statue of Louis

XV., which was erected by order of the city of Paris, was committed to him. He labored 12 years on this with inconceivable perseverance, and has left in the horse a model which may be ranked with any work of antiquity. His pieces bear the character of simple grandeur, but, in general, more fire is to be desired in his sculpture. Latterly he adopted a more polished, delicate manner, to suit the taste of the age. Caylus has written his life.

Boucher, boo-shā, Alfred, French sculptor: b. Bouy-sur-Orvin, 1850. He studied under Dumont and Paul Dubois. His statues include 'Venus Astarte' and 'At the End,' both bought by the French government for the Luxembourg Gardens; 'Eve After the Fall'; 'The Earth'; and 'A Sleeping Woman.'

Boucher, François, frān-swā, French painter: b. Paris, 29 Sept. 1703; d. 30 May 1770. While a pupil of the celebrated Lemoyne he gained at the age of 19 the first prize of the Academy. He produced with remarkable facility, and his sketches alone amounted to more than 10,000. He also etched some plates, and many of his paintings have been engraved. Some of his more important works are: 'L'Aurore et Céphale'; 'Diane Sortant du Bain'; 'Femme Couchée'; 'Le But'; 'Le Repos en Egypte'; etc. He was a director of the Academy of Painters.

Boucher, bow'-chēr, Jonathan, English clergyman: b. Cumberland, 12 March 1738; d. Epsom, 27 April 1804. He came to Virginia about 1754; officiated first as private teacher, and, after receiving episcopal ordination in England, as rector in Virginia and Maryland until 1775, when he returned to his native country, his anti-revolutionary sentiments having given umbrage to his American congregation. From 1784 to the time of his death he officiated as vicar of Epsom, Surrey. He is the author of a glossary of provincial and archaeological words, which was intended by him as a supplement to Dr. Johnson's dictionary. In 1799 he published 2 assize sermons, and 15 sermons which he had delivered during his ministry in America, and which treated of the American Revolution. These he dedicated to Washington; they are interesting from the political anecdotes which they contain.

Boucher, Pierre, pē-ār boo-shā, French pioneer in America: b. Perche, France, 1622; d. Boucherville, Canada, 20 April 1717. He came to Canada in 1635, took part in an Indian war, and was sent to France in 1660 as a deputy for the colony of New France. He was later made governor of Three Rivers. He wrote 'A True History of the Customs and Products of New France.'

Boucher de Crèvecœur de Perthes, Jacques, zhāk boo-shā dē krāv-kēr-dē pārt, French anthropologist: b. Réthel, 10 Sept. 1788; d. Abbeville, 5 Aug. 1868. Through his father, an active botanist, he came under the notice of Napoleon, and was employed in numerous missions to Italy, Germany, Austria, and Hungary. After the Restoration he lived at Abbeville. He wrote travels, poems, and an early apology for free trade; but only his works on the archaeology of man are of consequence now. The first, 'On the Creation' (5 vols. 1839-41), already brought him some reputation, but his long investigations on stone weapons and other

remains of early human civilization in the Tertiary and older Quaternary Diluvial strata made him famous. His most striking discovery was that of a fossil human jawbone in the quarries of Moulin-Quignon, near Abbeville, in 1863. Other works of great value are 'Celtic and Antediluvian Antiquities' (3 vols. 1846-65); and 'Antediluvian Man and His Works' (1860).

Bouches - du - Rhone, boosh dū rōn, ("Mouths of the Rhone"), a department in the south of France, in the ancient government of Provence, bounded north by Vaucluse, west by Gard, east by Var, and south by the Mediterranean. Chief town, Marseilles. Area, 1,971 square miles, of which about half is under cultivation, the remainder being occupied by forests, heaths, wastes, water, etc. Between the Rhone and the lagoon of Berre is the great plain of La Crau. Its borders are tolerably well cultivated and support a number of cattle; but the centre is little better than a desert of stones and pebbles, affording, however, winter pasture for sheep. The Rhone is the principal river; near Arles it divides into two branches which enclose an island called La Camargue. Several canals facilitate transport and are especially useful for irrigation. The climate is generally very warm, with little rain during the summer. A cold and generally violent wind, called mistral, always blows from the Cevennes after rain. It lasts from 3 to 9, sometimes, though rarely, even 12 days, and dries up the ground with astonishing rapidity. The soil of the department is for the most part arid and unproductive without irrigation. Vines, however, thrive, and almonds, figs, capers, nuts, and particularly olives, are extensively cultivated. The minerals are of little commercial importance. Salt is extensively manufactured from the lagoons, and the salt-works of Berre are celebrated both for the quality and quantity of their produce. The articles manufactured, besides salt, are principally soap, brandy, olive oil (the best in France), soda, chemicals, vinegar, scents, leather, glass, etc. The fisheries are productive. The department includes the three arrondissements of Marseilles, Aix, and Arles. Pop. about 700,000.

Boucicault, Dion, dī'on boo'sē-kō, Irish dramatic author and actor: b. Dublin, 26 Dec. 1822; d. New York, 18 Sept. 1890. He was educated at London University and wrote his first play, 'London Assurance,' when he was only 19 years old. This was produced at the Covent Garden Theatre in London and won immediate success. He made his first appearance as an actor in 1852 in his own play, 'The Vampire'; in 1853-60 he was in the United States, where his success on the stage was as great as it had been in England. He founded a theatre in Washington and reconstructed the Metropolitan Theatre in New York, but was not very successful as a manager. Returning to London in 1860 he brought out 'The Colleen Bawn,' one of his best-known plays, and was at one time joint manager of the Adelphi and manager of a new theatre, the Westminster. The latter venture was unsuccessful, but he shortly afterward brought out a number of very popular plays. In 1876 he came to New York, where he lived until his death. He continued his work as both actor and playwright, and also opened the New Park Theatre on Broadway.

BOUCICAULT—BOUGAINVILLE

Boucicault wrote about 400 plays, many of which were adaptations; among the best not already mentioned are: 'Old Heads and Young Hearts'; 'Love in a Maze'; 'Used Up'; 'Corsican Brothers'; 'The Octoroon,' dealing with the condition of the slaves in the United States; 'The Streets of London'; 'The Shaughraun'; 'Daddy O'Dowd'; and 'Foul Play,' a dramatization of Charles Reade's novel of the same name. In 'The Colleen Bawn' he created one of his favorite types, the Irish hero that appears in many of his plays. He also rewrote and adapted 'Rip Van Winkle' especially for Joseph Jefferson's use. While writing his numerous plays he found time to engage in a political controversy with Lord Beaconsfield over the rights and liberties of the Irish people. He introduced many improvements in the staging of plays, being the first to use carpets on the stage and moving scenery.

Boucicault, Mrs. Dion, English actress. Before her marriage to Boucicault she had won success as Agnes Robertson in 'Our Clerks' and other plays. After her marriage she came with her husband to the United States, but returned with him to London in 1860 and took important parts in several of his plays. She again came to the United States and was later separated from her husband.

Boudin, Eugène, è-zhân boo-dăn, French painter: b. Honfleur, 12 July 1824; d. 8 Aug. 1898. He lived in Paris for most of his life, traveling somewhat in Brittany and Holland. He was devoted to the painting of seaports and river scenes, the gray expanses of French skies and waters, the picturesque confusion of ships in harbors. Among his works are: 'Fishing'; 'The Meuse at Rotterdam'; 'Low Tide'; 'High Tide'; 'Getting Under Sail'; 'A Dutch Bark at Antwerp'; and 'Bordeaux Harbor.'

Boudinot, boo-dī-not, Elias, American philanthropist: b. Philadelphia, 21 April 1740; d. Burlington, N. J., 24 Oct. 1821. He studied law at Princeton with Richard Stockton, and in 1760 commenced practice at Elizabethtown, N. J. He early became a devoted advocate of the patriot cause, and in 1774 was a member of the Provincial Convention which took the control of New Jersey out of Gov. Franklin's hands. Congress appointed him commissary-general of prisoners, 15 May 1777; he was elected to Congress in 1777, 1780, 1781, and 1782, and was chosen its president 4 Nov. 1782, and as such signed the treaty of peace with Great Britain. He was director of the mint at Philadelphia 1795-1805, being appointed by Washington, whose trusted friend and counselor he was throughout the Revolution and afterward. From 1772 to 1805 a trustee of the College of New Jersey (Princeton), he founded its cabinet of natural history with a liberal contribution. He was active in the organization of the American Bible Society, becoming in 1816 its first president. By his will he left the bulk of his large estate to various institutions and charities. He wrote: 'The Age of Revelation' (1790), to counteract Paine's 'Age of Reason'; 'Oration 4 July 1793,' before the New Jersey Society of the Cincinnati; 'Second Advent of the Messiah' (1815); 'The Star of the West' (1816), an attempt to identify the North American Indians with the descendants of the lost tribes of Israel.

Boudinot, Elias, Cherokee Indian: d. 10 June 1839. He was one of three Cherokee youth brought before Elias Boudinot (1740-1821) in 1818, and he received that philanthropist's permission to assume his name. He was educated at the mission school at Cornwall, Conn., and married a white lady of that place. He became a man of considerable talent and ability, and of influence among his people. In December 1835, he, with others of his nation, was persuaded to make a treaty with the United States. He was thereupon accused of having betrayed his country and was murdered by the John Ross party west of the Mississippi, 10 June 1839. He published 'An Address to the Whites' (1826), delivered at Philadelphia, 25 May 1825, and edited the *Cherokee Phoenix*, 1828-34.

Boufflers, Louis François, 100-ë frân-swā boo-flār (DUC DE, dük dè), French soldier: b. 10 Jan. 1644; d. Fontainebleau, 20 Aug. 1711. He saw active service under Condé, Turenne, Crequi, Luxembourg, and Catinat, and was created a marshal of France in 1693. His defense of Namur in 1695, and of Lille in 1708, are famous. The siege of the former place was conducted by King William in person, and cost the allies more than 20,000 men. The latter was conducted by Prince Eugène. An order was sent from Louis XIV., signed by his own hand, commanding Boufflers to surrender; but he kept it secret until all means of defense were exhausted. The retreat of the French after their defeat at Malplaquet, under the direction of Boufflers, was more like a triumph than a defeat.

Boufflers, Stanislaus, Chevalier de, shë-vā-lë-ä dè stân'is-low, French soldier and author (son of the Marchioness of Boufflers, mistress of Stanislaus, king of Poland): b. Luniville, 31 May 1738; d. Paris, 18 Jan. 1815. He entered the army, was soon appointed governor of Senegal, and while in this office made many useful regulations. After his return he devoted himself to that light kind of literature which distinguished the age of Louis XV. His reputation gave him a seat in the States-General, where he was esteemed for his moderation and his good intentions. After 10 Aug. 1792 he left France and met with a friendly reception at Reinsberg from Prince Henry of Prussia, and Frederick William II. A large grant was made to him in Poland for establishing a colony of French emigrants. In 1800 he returned to Paris, where he devoted himself to literary pursuits which in 1804 procured him a seat in the French Institute. He lies buried near the Abbé Delille, and on his tomb is this inscription, written by himself and characteristic of his lively disposition: "Mes amis, croyez que je dors." His works were published in 8 12mo volumes in 1815.

Bougainville, Louis Antoine de, 100-ë än-twān de boo-gān-vël, French soldier and statesman: b. Paris, 11 Nov. 1729; d. same place, 31 Aug. 1811. At first a lawyer, afterward a distinguished soldier, diplomatist, and scholar, he was always remarkable for his energy of character. He fought bravely in Canada under Montcalm, and it was principally owing to his exertions in 1758 that a body of 5,000 French withstood successfully a British army of 16,000 men. Toward the conclusion of the battle he received a shot in the head. The governor of Canada, finding himself unable to

BOUGAINVILLE ISLAND—BOUGIE

defend the colony, sent Bougainville to France for reinforcements. He set off in November 1758, and returned January 1759, after the king had made him colonel and knight of St. Louis. After the battle of Quebec, 13 Sept. 1759, in which Montcalm was killed, and the fate of the colony decided, Bougainville returned to France and served with distinction under Choiseul Stainville, in the campaign of 1761, in Germany. After the peace he entered the navy and became one of the greatest naval officers in France. He persuaded the inhabitants of St. Malo to fit out an expedition for the purpose of establishing a colony in the Falkland Islands, and undertook the command of the expedition himself. The king appointed him captain, and Bougainville set sail with his little fleet in 1763. But as the Spaniards had a prior claim to the islands France was obliged to surrender them, and Bougainville, having returned to France, was commissioned to carry the surrender into execution on receiving from Spain a remuneration for his expenses. For this purpose he set sail with one frigate and a merchant ship from St. Malo, 15 Dec. 1766. After the immediate object of his voyage was accomplished he circumnavigated the world and returned to St. Malo 16 March 1769. He enriched the science of geography by a number of new discoveries. In the American war he commanded several ships of the line with great honor; was in 1779 chief of squadron and in the following year field-marshal in the land forces. After 1790 he devoted himself to science, and in 1796 was admitted to the Institute.

Bougainville Island, an island in the Pacific Ocean, belonging to the Solomon group and under German protection; area, 4,000 square miles. It is separated from Choiseul Island by Bougainville Strait.

Bougainvillea, a small genus of South American tropical shrubs of the natural order *Nyctaginaceae*, largely used for ornament in warm climates and in greenhouses. Their chief beauties are their large, brilliantly colored bracts, which subtend the inconspicuous flowers. In the climbing species, which are the most popular, the bracts are so numerous as to conceal the foliage and stems as well as the walls upon which the plants are trained. They often remain thus attractive for months. Because of their ease of propagation and cultivation they are rapidly growing in popularity in the United States. For discussion of species, propagation, and cultivation, consult Bailey and Miller, 'Cyclopedia of American Horticulture' (New York 1900-2).

Bough, Samuel, English painter: b. Carlisle, 8 Jan. 1822; d. Edinburgh, 19 Nov. 1878. He never obtained any systematic art instruction. In 1845 he was a scene-painter in Manchester, and later in Glasgow, where Daniel Macnee encouraged him to become a landscape-painter; and he shortly produced 'Shipbuilding on the Clyde.' Among the more important of his oil pictures are: 'Edinburgh from the Canal' (1862); 'Holy Island' (1863); 'In the Trossachs' (1865); 'The Vale of Leith' (1866); 'Kirkwall Harbor' (1867); 'Borrowdale'; 'St. Monance'; 'London from Shooter's Hill' (1872). His 'Royal Volunteer Review' (1860) is in the National Gallery of Scotland. His best oil pictures are spirited and

expressive in touch, and possess a fine sense of atmosphere; but he frequently painted carelessly and hurriedly, and produced much, especially during his later years, that was unworthy of his brush. His numerous water-colors are of more uniform excellence; they are strongly influenced by the example of David Cox, and are especially remarkable for the delicate gray tones of their skies. He settled in Edinburgh in 1855. A collection of over 200 of his works was brought together in the Glasgow Institute in 1880.

Bought and Sold Notes, written memoranda of a transaction, made by the broker in the case, and delivered by him to his principals. They state respectively that the broker has bought for the vendee, and sold for the vendor, the subject of the transaction. When the broker has not exceeded his authority, both parties are bound thereby (4 Esp. 114; 2 Camp. 337). No particular form is required, but there are four kinds: (1) 'Where the broker professes to act for both parties, whose names are disclosed in the note. (2) Where the broker does not disclose in the bought note the name of the vendor, nor in the sold note the name of the buyer, but still shows that he is acting as broker and not as principal. (3) Where the broker, on the face of the note appears to be the principal. (4) Where he professes to sign as broker, but is really the principal' (4 Am. & Eng. Enc. Law, 751). The bought and sold notes, however, do not constitute the contract. They may, however, be accepted as evidence of the contract, and not the original contract, when so established by the usage of trade.

Boughton, bōr'tōn, George Henry, English painter: b. near Norwich, England, 1833; d. London 19 Jan. 1905. His parents came to the United States in 1839, and settled in Albany. He studied art without a master, and in 1853 went to London and Paris to continue his studies. After 1861 he resided in London. His best pictures were 'The Idyl of the Birds'; 'Hay-Harvest in Brittany'; 'The Scarlet Letter'; 'Way-side Devotion'; 'Puritans Going to Church'; 'Snow in Spring'; and 'The Return of the Mayflower.' He became a member of the National Academy in 1871; associate of the Royal Academy, London, in 1879; and member of the Royal Academy in 1896.

Boughton, Willis, American educator: b. Victor, N. Y., 17 April 1854. He graduated at the University of Michigan, and since 1892 has been professor of rhetoric and English literature at Ohio University. He has won note in the work of university extension. His writings include 'Mythology in Art' and 'History of Ancient Peoples.'

Bougie, boo-zhē', Algeria, a port on the Bay of Bougie, 120 miles east of Algiers. Bougie was the Saldæ of the Romans, and in the 5th century was a chief seat of the Vandals. Under the Arabs it was raised to such importance that it was called Little Mecca, and was the entrepôt of the trade between Christendom and north Africa; but after various vicissitudes it had sunk to a small village in 1833, when the French captured the place. Their extensive works have since rendered it a strong fortress and a commercial centre of some value. Pop. about 8,000.

BOUGIE — BOUILLON

Bougie (Fr. "taper"), in surgery, a smooth cylindrical rod, designed to widen the canals of the human body by its introduction therein, or to apply medicaments to a particular part of the interior of the body. It is distinguished from a catheter by being solid, while the latter are hollow and open at the ends for the purpose of affording a passage for fluids. Bougies are generally pointed at one end, and grow gradually thicker toward the other end, but in some cases they are of the same thickness throughout their whole length, the ends being only rounded off. They are made sometimes of linen dipped in wax and then rolled up, sometimes of a kind of plaster and linen, also of caoutchouc or gutta-percha, or of metal, such as lead, silver, or German silver.

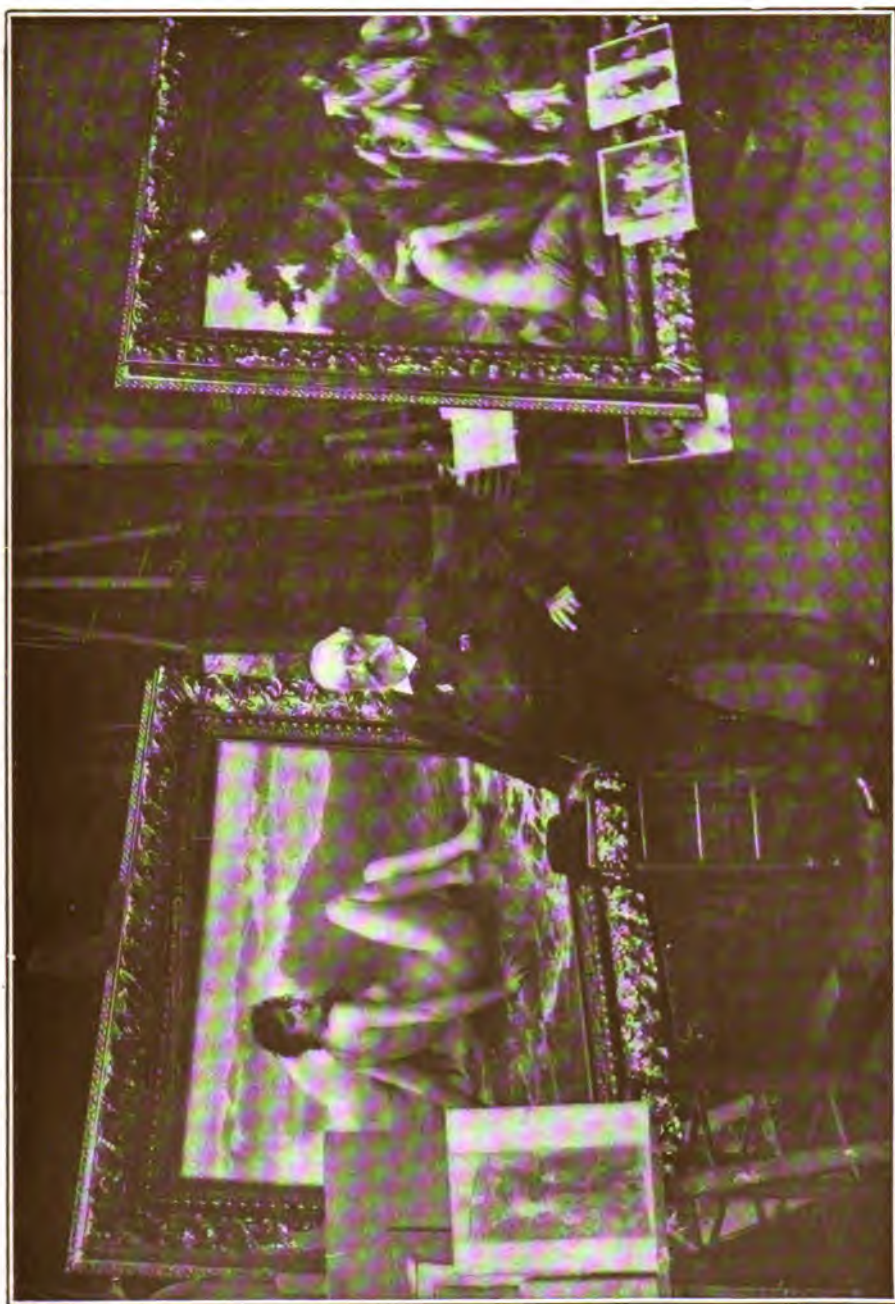
Bouguer, Pierre, pê-är boo-gā, French scientist: b. Croisic, Brittany, 16 Feb. 1698; d. 15 Aug. 1758. He studied the elements of mathematics under his father, who was an able hydrographer, and is well known as the author of an excellent 'Treatise on Navigation.' In 1727 he gained a prize at the French Academy for the best essay on the masting of vessels. He gained similar prizes in 1729 and 1731, and added still more to his fame by a work entitled 'Traité de la Gradation de la Lumière,' in which he endeavors to ascertain the quantity of light absorbed by transparent bodies, explains the construction of several ingenious instruments which he had invented for the purpose of facilitating such investigations; and maintains that the light of the sun is more intense at its centre than on the edges of its disk, while in the moon the reverse is the case. About this time the figure of the earth was the subject of frequent discussion in the Academy of Sciences; and for the purpose of ascertaining exactly how much it was elevated at the equator and flattened toward the Poles, it was proposed to measure the length of a degree at each of these positions, and at the same time make other observations and experiments of importance to astronomy and navigation. An expedition was accordingly fitted out, in which Bouguer was associated with Godin and La Condamine. The main burden of the task fell upon Bouguer, who published the results in a work entitled 'Théorie de la Figure de la Terre.' A quarrel with La Condamine concerning the honors of the work embittered the latter part of his life, and probably hastened his death.

Bouguereau, Guillaume Adolphe, gē-yōm-ē äd-ōlf boo-grō, French painter: b. La Rochelle, 30 Nov. 1825; d. there 20 Aug. 1905. After many hardships he succeeded in reaching Paris, where he was educated at the studio of Picot and at the Beaux Arts. In 1850 he gained the Prix de Rome and went to Italy to study. His first great success was 'The Body of St. Cecilia Borne to the Catacombs' in the Salon of 1854. Among his paintings are: 'The Meeting of Christ with His Mother'; an 'Annunciation'; 'The Holy Women at the Sepulchre'; 'The Triumph of Venus,' etc. He paints portraits occasionally, but his subjects are chiefly ideal, idyllic, and religious. He is a thorough draftsman, and is thought to excel in the painting of flesh. In 1885 he received the medal of honor at the Salon, was president of the Society of Artists, and received the medal of the Legion of Honor.

Bouilhet, Louis, loo-ē boo-ē-yā, French poet: b. Cany, 27 May 1822; d. Rouen, 19 July 1869. He first achieved fame with 'Melenis, a Story of Rome' in the time of the Cæsars, and 'The Fossils,' a series of delineations of antediluvians. His versified dramas, 'Mme. de Montarcy' (1856); 'Dolorès' (1862); and especially 'The Conspiracy of Amboise,' are elegant in style, rich in imagery, perfect in melody, but lack compactness of structure and are open to moral censure. The same faults are found in his comedies, 'Uncle Million' (1861); 'Faustine' (1864); and especially in his posthumous 'Mlle Aissé.'

Bouillé, François Claude Amour, frān-swā clōd ä-moor boo-ē-yā (MARQUIS DE), French soldier: b. Cluzel Castle, Auvergne, 19 Nov. 1739; d. London, 14 Nov. 1800. He distinguished himself in the Seven Years' war; was appointed governor of Guadaloupe in 1768; and conquered Dominica, St. Eustatia, Tobago, St. Christopher, Nevis, and Montserrat. After the Peace of 1783 he returned to Paris and was appointed lieutenant-general. He afterward traveled in England, through Holland and a great part of Germany, until he was made chief of the province Trois-Evêchés. In the Assembly of Notables (1787-88) he declared for the proposed reforms of Calonne, which, however, were defeated by Cardinal Brienne. He was opposed to the plan of Necker for the union of the provinces. At the breaking out of the Revolution he supported the existing government, both in his former province and in Lorraine, Alsace, and Franche-Comté. It was only at the urgent desire of the king that he swore allegiance to the constitution of 1791. He repressed in 1790 the rebellion of the garrisons of Metz and Nancy; and although the National Assembly decreed him a vote of thanks for the bravery and ability he had displayed on this occasion, still the revolutionists distrusted him. Shortly afterward he made preparations to assist Louis XVI. in his escape. Bouillé had made his arrangements well, and had not the king forbidden any bloodshed he certainly would have rescued him. Being thus compelled to leave the king at Varennes to his fate, he fled from the dangers to which he himself was exposed by the attacks of the revolutionists. From Luxembourg he wrote a threatening letter to the National Assembly, and then exerted himself to excite the foreign powers against the republic. He succeeded well at Vienna, gained over Gustavus III., and obtained the promise of 30,000 men from the Empress Catherine II., to be put under the command of the king of Sweden and the French general. But Gustavus was murdered, the empress forgot her promises, and Bouillé went over to England in 1796. Here he wrote his 'Memoirs of the Revolution,' which appeared in an English translation (Lond. 1797), and, after his death, in the original.

Bouillon, boo-ē-yōn, the name of one of the most distinguished historical families of France. The last Duke of Bouillon of the first line had sold the duchy to the bishop of Liège, but a new line arose toward the end of the 15th century. It originated with a cadet of the house of Marck, which, at the commencement of the 15th century, possessed the principality of Sedan. In 1482 William de la Marck, well-known as 'The Boar of Ardennes,' seized the



Courtesy of the Booklovers Magazine

WILLIAM ADOLPHE BOUGUEREAU

BOUILLON — BOULAINVILLIERS

territory of Bouillon, belonging to the bishopric of Liège, and conferred it on his brother Robert. The bishop of Liège attempted by force to regain it, but this Robert, and a son of the same name who succeeded him, were successful in resisting; and at the end of the war, which was brought to a close in 1492 by the mediation of the king of France, Robert the younger remained virtually, if not formally, Lord of Bouillon. The third Robert succeeded his father last mentioned; and having, like his predecessors, entered the service of France, was made prisoner with Francis I. at the battle of Pavia. He afterward obtained a marshal's baton, and under the name of Marshal de Fleuranges, which was the title he assumed, is known as the author of very curious memoirs. Robert IV., son of Robert III., appears to have been temporarily dispossessed by the bishop of Liège, but recovered possession, and not only became marshal of France, but received the title of Duke, and thus became the first Duke of Bouillon of the new line. He was taken by the Spaniards at the siege of Hesdin in 1553; and three years after, when he had been liberated on parole for the purpose of procuring the 60,000 crowns at which his ransom had been fixed, died by poison. His wife was a daughter of the celebrated Diana of Poitiers. His son, Henry Robert, lost Bouillon, which, by the Treaty of Château-Cambray, returned to the bishop of Liège, but he still preserved the title, and transmitted it to his son William Robert, who died in 1588 without having married. The male line thus became extinct. He was survived by a sister, who married Henri de la Tour d'Auvergne, Viscount Turenne, but died without children in 1594. She had, however, bequeathed her possessions to her husband, and thus the two powerful houses of Turenne and Bouillon were merged into one. This new Duke of Bouillon was one of the most distinguished personages of his time. He was at first devotedly attached to Henry IV. while he was fighting his way to the throne, but afterward leagued with his enemies; and, being implicated in the conspiracy which cost Marshal Biron his life, was long obliged to live in exile. He was restored to favor in 1606, and figured much during the intrigues in the subsequent part of the following reign; and, having embraced the doctrines of the Reformed Church, became one of its most distinguished leaders. He died in 1623, leaving two sons, the younger of whom was the celebrated Marshal Turenne. The elder, named Frédéric Maurice, after serving with distinction in the Low Countries, returned to France, became a Roman Catholic, served Louis XIII., then joined the insurrection against him headed by the count of Soissons, and helped him to gain the battle of Murfée. During the Fronde he joined the princes and took a prominent part in the civil war, but was reconciled to the court in 1651, obtained the title of prince, and received large accessions of territory in exchange for the principality of Sedan. He died in 1652, leaving interesting memoirs of his life and times. He was succeeded by Godefroi Maurice, who figured much in the wars of the period and became great chamberlain to Louis XIV., and who died in 1721. One of his brothers was the celebrated Cardinal de Bouillon, who was born in 1644, obtained the cardinalate when only 26 years of age, was long the representative of the

Gallican Church at Rome, made himself notorious by his vanity, ambition, and intriguing spirit, and died in 1715.

Bouillon, originally a German duchy, now a large district in Belgium, 9 miles wide and 18 long, on the borders of Luxembourg and Liège. This woody and mountainous tract consists of the town of Bouillon with 2,800 inhabitants, and 25 villages with 20,000 inhabitants. The town was once the capital of the duchy of the same name. This ancient place lies in the midst of hills, on the left bank of the Semois, which abounds with fish, 40 miles from Liège and 8 from Sedan. It has a strong castle upon a rock, which, however, is commanded by the neighboring mountains. Godfrey of Bouillon once possessed the dukedom of this name. He was Duke of Lower Lorraine, and Bouillon was bestowed upon him as belonging properly to the county of Ardenne. In order to supply himself with funds for his expedition to the Holy Land, Godfrey mortgaged his duchy of Bouillon in 1095 to the bishop of Liège. After the estate had been held for many years by the bishopric, the houses of La Marck and La Tour d'Auvergne laid claims to Bouillon, but in 1641 relinquished their pretensions to the bishop of Liège for 150,000 Brabant guilders. In the war of 1672 France conquered Bouillon, and Louis XIV. gave it in 1678 to the Chevalier La Tour d'Auvergne, his chamberlain. After this time it belonged to the house of La Tour until the Revolution, when it was taken from them in 1792. The last possessor, Godfrey Charles Henry de La Tour d'Auvergne, died December 1812. By the Peace of Paris, in 1814, the dukedom was included in that of Luxembourg, which had fallen to the king of the Netherlands. The title of prince of Bouillon was assumed in 1792 by Philip d'Auvergne, captain in the British navy, and he continued to bear it till his death in 1816. The congress which met at Vienna in 1815 appointed commissioners to investigate the comparative claims of this nobleman and Prince Charles of Rohan. They decided in favor of the latter. By him it was sold to the Netherlands in 1821, and on the division of the kingdom at the revolution of 1830 it fell to Belgium.

Bouilly, Jean Nicolas, zhôn nê-kô-lâr boo-ê-yê, French poet: b. Coudraye, 4 Jan. 1763; d. Paris, 14 April 1842. He made his début with the comic opera 'Peter the Great' in 1790. For a few years he was judge and prosecuting attorney at Tours, and then was called to Paris to assist in organizing the primary school system. He was a man of ancient Roman virtue, and his character is reflected in all his works. His comedies and comic operas (music by the first masters) were eminently successful as well in Germany as in France, particularly 'The Abbé de l'Épée,' 'The Two Days,' 'Mme. de Sévigné.' He also wrote 'Stories for French Children,' and 'Counsels to My Daughter.'

Boulainvilliers, Henri de, ôh-rê dê boo-lân-vê-yâ, French historian: b. Saint Saire, Normandy, 11 Oct. 1658; d. 23 Jan. 1722. He studied at the College of Juilli, entered the army, but shortly after became devoted to historical and antiquarian pursuits. He wrote a number of works in connection with the history of France, but is perhaps best known by his 'History of Mohammed,' in which he writes in a very Oriental style, lauds the Prophet, and

BOULANGER — BOULEVARD

seems almost disposed to become a believer in the Koran. He is said to have been much addicted to astrology.

Boulanger, Georges Ernest Jean Marie, zhōrh zhār-nēst zhōn mā-rē boo-lōn-zhā, French soldier: b. Rennes, 29 April 1837; d. Brussels, 30 Sept. 1891. After a successful career in Algeria and in the East he became minister of war in 1886, and the fact that a new man was in possession of that portfolio was speedily felt. He introduced many needful reforms, insisted on the adoption of a repeating rifle, and caused important experiments to be made with high explosives. In the ministerial crisis of 1887 he lost his portfolio and was appointed to the command of the 13th Army Corps, but was retired, 28 March 1888. In January 1889 he was elected deputy to the National Assembly by 81,000 majority, in consequence of which the Floquet ministry resigned. In August 1889 he was charged with embezzlement, treason, and conspiracy, and found guilty by the Senate; the elections in the 12 cantons were annulled, and he was sentenced to deportation.

Boulanger, Gustave Rodolphe Clarence, goos-tāv rō-dōlf klā-rōns, French painter: b. Paris, 25 April 1824; d. Paris, 22 Sept. 1888. He had a wide reputation as a painter of classical subjects; received the Prize of Rome in 1849, and was decorated with the Legion of Honor in 1865.

Boulanger, Louis, loo-ē, French painter: b. Vercelli, Piedmont, 11 March 1806; d. Dijon, 7 March 1867. He studied under Guillon-Lethière and Deverias; became acquainted with Victor Hugo and illustrated many of his works; also taking subjects for many of his paintings from the poems of Hugo and Chateaubriand. Among his paintings are 'Mazeppa,' 'The Triumph of Petrarch,' and 'Macbeth.'

Boulay de la Meurthe, Antoine Jacques Claude Joseph, ān-twān zhāk klōd zhō-zéf boo-lā-ē dē lā mērt (COUNT), French lawyer and politician: b. Chamousey, Lorraine, 19 Feb. 1761; d. Paris, 2 Feb. 1840. During the Revolution he served as a volunteer in the army, and as a judge on the bench, until the Reign of Terror, when he was outlawed. After the 9th Thermidor he was appointed presiding judge of the civil court, and afterward held the office of attorney-general at Nancy. He sat in the Council of Five Hundred, was active in the *coup d'état* of the 18th Fructidor, and aided in the revolution of the 18th Brumaire. Being appointed chairman of the legislative section in the Council of State, he took an active part in digesting the *Code Civil*. On the first restoration he kept aloof from public affairs; during the Hundred Days he was again a minister of state; on the abdication of Napoleon I. he caused his son to be proclaimed as Napoleon II., and was appointed minister of justice by the commission of government. He was, of course, outlawed by the returning king, and for four and a half years was an exile. In 1819 he was permitted to return to France.

Boulay de la Meurthe, Henri George, ōn-rē zhōrh zh (COUNT), son of the preceding: French statesman: b. Nancy, 15 July 1797; d. 1858. He took an active part in the revolution of 1830. In 1837 he was elected to the chamber of deputies. In 1843 he voted for the repeal of the

decree of banishment against the Bonaparte family. In February 1848 he sided with the moderate Republicans, was elected to the Constituent Assembly, and there again supported the motion for the return of the Bonaparte family. When Louis Napoleon was elected president the name of Boulay de la Meurthe was placed by him at the head of the list of candidates for the vice-presidency; and the assembly almost unanimously chose him. After the *coup d'état* of 1851 he was made a member of the Senate.

Boulder, Col., city and county-seat of Boulder County, situated on Boulder Creek and the Union Pac. and other railroads; 30 miles north of Denver, the State capital. It is in a noted gold, silver, coal-mining, agricultural, and stock-raising region, at the eastern base of the Rocky Mountains. It was settled in 1858 and received a city charter in 1880; is the seat of the State University; and has three national banks, daily and weekly periodicals, and a property valuation of over \$1,000,000. The famous Boulder Cañon is an object of wide interest to the tourist. Pop. (1910) 9,539.

Boulder, a rounded water-worn stone of some size; in geology, applied to ice-worn and partially smoothed blocks of large size lying on the surface of the soil, or embedded in clays and gravels, generally differing in composition from the rocks in their vicinity, a fact which proves that they must have been transported from a distance, probably by ice. When lying on the surface they are known as "erratic blocks."

Boulder Clay, the name given to the mass of clay, sand, and boulders deposited by the ice-sheet which invaded the northern portions of North America and Europe during the Pleistocene period. It is also known as "till" and "ground moraine." The material is generally compact and tenacious and shows no stratification, the stones and boulders being irregularly distributed. It represents the detritus carried along beneath the ice and finally left in its present position covering the eroded rock-surfaces upon the retreat of the glacier. Its thickness varies from a few inches to 100 feet or more; the heaviest accumulations are gathered into rounded hills called drumlins (q.v.). The stones included in boulder clay are usually oblong with rounded edges and frequently with striated surfaces, the latter being produced by the friction of the moving mass. See *DRIFT*; *GLACIAL PERIOD*.

Boulevard, bool-vār (O. Fr. *boulevard*, a word derived from the German *bollwerk*, the same as the English "bulwark"). The word was formerly applied to the ramparts of a fortified town, but when these were leveled, and the ditches belonging to them filled up, and the whole planted with trees and laid out as promenades, the name "boulevard" was still retained, and thus came to have its present signification. The most famous boulevards are those of Paris, especially those which, in the time of Louis XIV., took the place of the fortifications on the northern side of the city, and became first a promenade and then a street. Modern usage has applied the word to many streets which were not originally ramparts, but which have been cut through the older and denser parts of the town, or have been laid out in the new quarters. All that the more modern boulevards have in

common with the older ones is that they are broad and are planted with trees. The modern boulevards are for the most part situated at some distance from the bustle of the town, and are therefore less frequented than the older ones, which are in the very heart of the city, and in the neighborhood of the chief resorts of amusement and pleasure. In the United States the name is applied to wide avenues planted with shade-trees, and with more or less ornament in the way of statuary, flower-beds, lawns, etc. The Thames Embankment, in London, though not usually called a boulevard, is of this order. See **PARIS**.

Boulger, Demetrius Charles, English writer: b. 14 July 1853. He is an authority on military topics and with Sir Lepel Griffin founded the 'Asiatic Quarterly Review' in 1885 and edited it for nearly five years. He has published 'Life of Jakoub, Bey of Kashgir' (1878); 'England and Russia in Central Asia'; 'Central Asian Portraits'; 'The History of China'; 'General Gordon's Letters from the Crimea'; 'Armies of the Native States of India'; 'Central Asian Questions'; 'Lord William Bentinck'; 'Short History of China'; 'Life of Sir Stamford Raffles' (1897); 'The Congo State' (1898); 'The Belgians at Waterloo'; 'India in the 19th Century' (1901).

Boulger, Dorothy Henrietta (THEO. GIFT), English novelist: b. 30 May 1847. She is a daughter of Thomas Havers of Thelton Hall, Norfolk, and married George S. Boulger (q.v.), in 1879. She began to publish in 1871, and is the author of 'True to Her Trust,' 'Pretty Miss Bellow,' 'Maid Ellice,' 'A Matter-of-Fact Girl,' 'Visited on the Children,' 'Victims,' 'Lil Lorimer,' 'An Innocent Victim,' 'A Garden of Girls,' 'Not for the Night-time,' 'Dishonored,' 'Wrecked at the Outset,' 'An Island Princess,' 'Women Who Work,' 'Cape Town Dicky,' 'The Little Colonists,' 'Fairy Tales from the Far East,' 'The Case of a Man with His Wife.'

Boulger, George Simonds, English botanist: b. Blechingly, Surrey, 5 March 1853. He has been professor of botany and geology at City of London College from 1884 and has published 'Familiar Trees' (1886-9); 'The Uses of Plants' (1889); 'Biographical Index of British and Irish Botanists,' with Britten (1893); 'The Country, Month by Month,' with Owen (1894-5); 'Elementary Geology' (1896); 'Flowers of the Field' (1900); 'Wood' (1902).

Boulogne-sur-Mer, boo-lôn sür măr, France, a seaport of the department Pas de Calais, at the mouth and on the right bank of the River Liane, with the suburb of Capécure on the left. The town proper consists of an upper and lower town. The former is surrounded with old and well-planted ramparts; the latter, which is the business section, has straight and well-built streets and is semi-English in character, many of the signboards being in English, the shops having an English air, and much English being spoken. The Church of Nôtre Dame (begun in 1827, consecrated in 1866) has a magnificent high altar, and a crypt, part of which dates from the 12th century. Among the churches, some of which are handsome edifices, there are several for the English population. The castle, which dates

from 1231, is a massive structure, communicating with the upper town by a bridge. It serves at present as a barrack and artillery depot. Here Louis Napoleon was imprisoned in 1840. Other noteworthy buildings are the Hotel de Ville, the Palais de Justice, the large and handsome bathing establishment, the library of 50,000 volumes, the museum of natural history and antiquities, the custom-house, the exchange, etc. Boulogne carries on various industries, is one of the chief French seaports, and is a great fishing centre, giving employment to about 5,000 hands. Extensive improvements in its accommodation for shipping are being carried out or projected. There is a large passenger traffic between Boulogne and Folkestone. Steamboats run daily between this place and England. Boulogne still exhibits some Roman remains. The Northmen took it in 882 and massacred the inhabitants. In 1544 the town was taken by Henry VIII. of England after a siege of six weeks. The English retained it till 1550, when Edward VI. sold it to France for 400,000 crowns. The Emperor Charles V. demolished it in 1553. During the first republic Boulogne received the name of Port de l'Union. With a favorable wind, vessels can reach the coast of England in two or three hours from this place. Bonaparte, therefore, ordered the harbor to be made deeper, and a number of vessels to be built in order to transport the army intended for the invasion of England, and some small forts and batteries to be erected in order to strengthen the harbor and the town. A large army remained here for many months in a camp, which almost resembled a town, waiting to embark; but upon the breaking out of hostilities with Austria in 1805 they were called to other places. Pop. about 50,000.

Boulogne-sur-Seine, sân, France, a town in the department of the Seine, southwest of Paris, of which it is a suburb. It is from this place that the celebrated Bois de Boulogne gets its name.

Boulton, Charles Arkoll, Canadian soldier and statesman: b. Coburg, 1841; d. 1899. He entered the British army in 1858 and served for 10 years. During the first Manitoba insurrection he fought against the rebels and was captured in 1870 and condemned to death; when the rebellion broke out the second time he commanded a corps organized by himself and known as the Boulton Scouts. He became a member of the Canadian Senate in 1889. He wrote 'Reminiscences of the Northwest Rebellion.'

Boulton, Matthew, English engineer: b. Birmingham, 3 Sept. 1728; d. Soho, 17 Aug. 1809. After being educated at a grammar school he was instructed in drawing by Worlidge, and he also studied mathematics. He engaged in business as a manufacturer of hardware, and as early as 1745 he is said to have invented and brought to great perfection inlaid steel buckles, buttons, watch-chains, etc., of which large quantities were exported to France, whence they were repurchased with avidity by the British as "the offspring of French ingenuity." In 1762 Boulton, finding his manufactory at Birmingham too confined for his purposes, purchased a lease of the Soho, about two miles distant, in the county of Stafford. This spot, then a barren heath, was gradually converted into an exten-

BOUNCING BET—BOUNTY LANDS

sive manufactory and school of the mechanical arts, where ingenious men found ample employment for their talents from the liberal patronage of the proprietor. The introduction of that important machine, the steam-engine, at Soho, led to a connection between Boulton and James Watt, of Glasgow, who became partners in trade in 1769.

Bouncing Bet, or **Old Maid's Pink**, an old-time garden flower common as a weed. See **SOAPWORT**.

Bound Brook, N. J., a town of Somerset County, situated on the Raritan River and on the Baltimore & O., the Central N. J., the Lehigh Valley, and the Philadelphia & R. R.R.'s. It has a large lumber trade, and manufactures woolen goods, electric dynamos, paint, roofing-paper, etc. During the Revolutionary War it was the scene of a surprise of the American troops by Cornwallis. The Americans, being largely outnumbered, were forced to retreat after a short battle. Pop. (1910) 3,970.

Boundaries, American. English monarchs were very ignorant of American geography and were perpetually making grants irreconcilably and even grotesquely conflicting; as when the grants to New Hampshire and New York each included all of Vermont, and those "westward to the South Seas" included all the possible territory out of which later grants, often with the very same phraseology, were made. The Wyoming dispute between Connecticut and Pennsylvania, and the Western Reserve of the former in Ohio, are only samples of the endless wrangles occasioned by these royal gifts; and a considerable part of intercolonial history is the account of the struggles—by influence before the Privy Council, or by compromise or outright war among themselves—by which the present limits were gradually shaped. Short of this, much interesting history is involved in the surveys, from that of Mason and Dixon's Line down to that between Connecticut and Massachusetts, which rectified lines admitted in theory. After the Revolution, jurisdiction over boundaries was assumed by Congress, which, in 1781, under the Articles of Confederation, provided minutely for the selection of a court to determine such cases, modeled on the Grenville Act of 1770. The adoption of the Constitution in 1788 placed all such matters in the final determination of the supreme court. The boundaries between foreign powers and the United States as a whole present a different problem, or rather a series of problems; for which see also **ALASKA**; **ANNEXATIONS**; **CANADA**; **FLORIDA**; **GADSDEN TREATY**; **LOUISIANA PURCHASE**; **MEXICAN WAR**; **NORTHEAST BOUNDARY**; **OREGON QUESTION**; **TREATY OF VERSAILLES**.

Bounty, a grant or benefaction from the government to those whose services directly or indirectly benefit it, and to whom, therefore, it desires to accord some recompense, or at least recognition. In law and commerce, it is a premium paid by a government to the producers, exporters, or importers of certain articles, or to those who employ ships in certain trades. This is done either with the view of fostering a new trade during its infancy, or of protecting an old one which is supposed to be of special importance to the country. In 1890 Congress passed an act providing for a premium to be paid to the producers of cane, beet, and sorghum sugar

by way of bounty. This bounty was in the nature of a contract (made with each and every person in the United States engaged in the cultivation of such varieties of sugar), providing that, in the event their produce attained a given standard of saccharine strength, they should receive the bounty provided therefor by the appropriation from the treasury. This act greatly stimulated the sugar-producing industry of the country, and large amounts of money have been invested, and a larger amount of sugar has been produced in the United States during the years that have followed the passage of the act than in any equal period in the history of the country. All bounties or premiums are not offered for the encouragement of domestic talent and industry to the exclusion of foreign competition. Many of those offered by the British and French governments, and by private associations, are held out to all competitors indiscriminately; and where the object is universal improvement, this is one of the appropriate modes of encouragement, though others concur with it, such as the monopolies of copyrights and patents, and the honors and distinctions conferred on those who make any important improvement. One other class of cases may, properly enough, be made the subjects of bounties or premiums; namely, the productions of extraordinary efforts of ingenuity and skill. A competition is in this way excited, by which none suffers, and all the effects of which are beneficial to a community.

Bounty Mutiny. See **BLIGH, WILLIAM**.

Bounty-jumper, a term used during the Civil War in the United States to denote one who enlisted in the United States military service to secure the bounty paid by the government for volunteers, and then deserted. Some of these enterprising individuals carried on a regular business of enlisting in one place under a certain name, hurrying to the front, receiving the bounty, deserting at once upon its receipt, and reappearing in some other place under a different name, only to re-enlist and repeat the process. The risks were great, but as the bounty was, in some cases, quite large, the practice found many votaries.

Bounty Lands. By royal proclamation of 7 Oct. 1763, American colonial governors were prohibited from making land grants west of the sources of the rivers flowing from the west or northwest into the Atlantic. This was to quiet the apprehensions of the Indians in the Ohio region that their lands were to be granted out. But Lord Dunmore of Virginia was empowered to offer bounties in land to all officers and soldiers who had served in the French and Indian war, and should personally apply to him for warrants,—5,000 acres to each field officer, 3,000 to captains, 200 to subalterns or staff officers, and 50 to private soldiers,—up to 200,000 acres, from the king's domain either in Canada or Florida, or the "crown lands." This was understood by Americans to mean precisely the above western lands, and those who had the ability and foresight selected choice tracts beyond the Alleghanies provisionally in hope of the government validating them later. Washington, for example, by himself and his land agent Crawford, had surveyed 70,000 acres, and secured patents in his own and other officers' names for 63,000, of which his own share was

BOUQUET — BOURBON

32,000 Dunmore began giving these warrants on his own responsibility as early as July 1773, and on 21 Jan. 1774 notified all gentlemen, officers, and soldiers to have their surveyors assemble at the mouth of the Great Kanawha River and proceed to survey their claims. The land agents and surveyors who went down the river were stopped and in some cases attacked by the Indians; and this was one of the agencies in bringing about Dunmore's War (q.v.), although trouble had been gathering for a long period from white settlement and Indian murders. The name "bounty lands" has been defined as pertaining to the Northwest Territory lands belonging to the States, because on 16 Sept. 1776 Congress offered land bounties to volunteers in the Revolution (assessing the money to buy them on the several States, to which Maryland objected because the other States had lands and she had none, and so would be unfairly taxed); but it does not appear that the phrase was ever used of them at the time.

Bouquet, boo-kā, Henry, British officer in the French and Indian wars: b. Rolle, Switzerland, 1719; d. Pensacola, Fla., 23 Aug. 1765. He entered the army of the States-General of Holland, then served in the Sardinian army against France and Spain but returned to the Dutch service in 1748 as an officer of the Swiss Guards. When war broke out between France and England in 1755, Bouquet was made lieutenant-colonel of an English regiment known as the Royal Americans. He reached Philadelphia in 1756 and in 1757 was ordered to Charleston with a small detachment of his regiment; but in 1758 returned to Pennsylvania and was made second in command of an expedition against Fort Duquesne in which George Washington also took part. The French deserted and set fire to the fort before the expedition reached there. This gave the control of Pennsylvania to the English, but Bouquet remained in the province, mostly at outlying posts. In 1763 the Indians united in an attempt to expel the English; they massacred many settlers, coming within a few miles of Lancaster, and blockaded Fort Pitt. There was no time to raise provincial troops if the fort was to be saved, so Bouquet set out with a force of 500 regulars, made his way through the forest, taking every precaution against surprise, and defeated the Indians at Bushy Run, within 20 miles of Fort Pitt. The number of the Indians that attacked him was as great as his own force, and his soldiers had never seen Indian warfare, but by skilfully feigning a retreat Bouquet drew the Indians from their cover and completely routed them by a sudden charge. In the following year he led a force of regulars and provincial troops to the forks of the Muskingum River, 150 miles west of Pittsburg. The Indians, overawed by his former victory and by his boldness in penetrating so far into the wilderness, were ready to make peace and surrender their white prisoners. He was subsequently made brigadier-general and commandant of the Southern Colonies of British America and went to Pensacola, where he died.

Bouquet, Jean Claude, zhōn klōd, French mathematician: b. 1819; d. 1885. In 1865 he became professor of mathematics in the Faculté des Sciences of Lyons. He was then called to

Paris, where he taught special mathematics at the Bonaparte Lyceum, and subsequently at the Louis-le-Grand Lyceum. In 1873 he was appointed professor of mechanics at the Sorbonne, and was elected member of the Academy of Sciences in 1875 in the place of M. Bertrand. He also received the decoration of the Cross of the Legion of Honor.

Bouquet de la Grye, Jean Jacques Anatole, zhōn zhāk ān-a-tōl boo-kā-dē-lā-gre', French hydrographical engineer: b. Thiers, Puy-de-Dôme, 20 May 1827. He studied at the Polytechnic School, whence he was graduated in 1847 in the hydrographical engineers, and in 1866 he became their engineer-in-chief. He became a member of the Institut; commander of the Legion of Honor, and a member of the Academy, elected in 1884. He is also a member of the bureau of longitudes and vice-president of the committee on hydrography. A project which he has long urged is to make Paris a seaport by means of a ship-canal up the Seine. He is also known as an inventor and improver of astronomical instruments. He has written 'Paris as a Seaport'; 'Notes on Soundings of the Sea'; 'A Hydrographic Study on the Bay of Rochelle,' etc.

Bouquet of Wine, a pleasant, non-spirituous aroma characteristic of good wines, and named on account of its real or fancied resemblance to the odor of flowers and fruits. The precise chemical nature of the substances that give rise to the "bouquet" is not known. They consist partly, without doubt, of a mixture of compound ethers, derived from fatty acids that are produced by the oxidation of albuminous substances and vegetable fats or oils. Essential oils of various kinds must also be included among them. According to some authorities, the kind of yeast that is used in the fermentation has much to do with the bouquet that is developed. Fruit blossoms are occasionally added to the must on account of the "ferment oil" that is developed by their fermentation, and which communicates a fruity smell to the wine. Elder flowers, when added to the must in this way, give rise to an aroma of Muscatel bouquet.

Bouquetin, boo-k'tān', a wild goat of the Alps and Pyrenees. See IBEX.

Bourbaki, Charles Denis Sauter, shārī dē-nē sō-tā boor-bā-ke, French general: b. Pau 22 April 1816; d. Bayonne 22 Sept. 1897. He entered the army in 1836, and fought in the Crimea and Italy. In 1870 he commanded the Imperial Guard at Metz, whence he was sent to England on a secret mission to the empress. Under Gambetta he organized the Army of the North, and commanded the Army of the Loire. His attempt to break the Prussian line at Belfort, though ably conceived, ended in disastrous failure; in a series of desultory attacks on a much inferior force, 15-17 Jan. 1871, he lost 10,000 men. In the wretched retreat to Switzerland that followed on the 27th, reduced to despair by the ill success of his plans, he attempted to commit suicide. From 1873 to 1879 he commanded the 14th Army Corps at Lyons, and in 1881 he retired from service.

Bourbon, Antoine de, ān-twān dē, Duke of Vendôme, and afterward king of Navarre: b. 22 April 1518; d. 17 Nov. 1562. He married, in

BOURBON—BOURBON FAMILY

1548, Jeanne d'Albret, only child of Henry II., king of Navarre, and assumed the title of king in her right. After the accession to the throne of France of the young king Francis II., he endeavored to obtain the control of the affairs of that country, but failed through his want of energy and perseverance. On the death of Francis II., in 1560, he was made lieutenant-general of the kingdom and adviser to the queen mother (Catherine de Medici) during the minority of her son. Upon the breaking out of the civil war, in 1562, he commanded the royal forces, and died of a wound received at the siege of Rouen. His son, Henry of Navarre, became king of France, as Henry IV. (1594).

Bourbon, Charles (CARDINAL), French prince and prelate; brother of Antoine de Bourbon; uncle to Henry IV., king of France: b. 22 Dec. 1520; d. Fontenay-le-Comte 9 May 1590. He was archbishop of Rouen, legate of Avignon, cardinal, peer of France, and member of the Council. In spite of family ties he ardently supported the Guises and the League, and was declared by that faction heir presumptive to the throne on the ground that his brother, Antoine, through heresy, had forfeited his claim. On the death of Henry III. he was declared king, as Charles X., and was recognized by a majority of the *parlements*; though he was all the while a prisoner at Fontenay-le-Comte.

Bourbon, Charles shârl (DUKE OF BOURBONNAIS), French general, known as CONSTABLE DE BOURBON; son of Gilbert, Count of Montpensier and Clara of Gonzaga: b. 17 Feb. 1489; d. 6 May 1527. He received from Francis I., in the 26th year of his age, the sword of Constable. By the coolness with which he faced death in posts of the greatest hazard he excited the admiration of his fellow-soldiers. When viceroy of Milan he won all hearts by his frankness and affability. His fame was not yet tarnished when the injustice of his king deprived him of his offices, banished him from France, and brought the family of Bourbon into disgrace, in which state it continued until the conclusion of the reign of Henry III. Whatever may be the true cause of her conduct, it is certain that the Duchess of Angoulême, mother of Francis I., strove to invalidate a formal donation of Louis XII. The constable, enraged at seeing himself deprived of his estates by the mother of the king whom he had served with so much fidelity and zeal, listened to proposals made him by Charles V. and the king of England. He experienced the usual fate of deserters; he was well received while his services were needed, but narrowly watched to secure his fidelity. Exposed as he was to the contempt of the Spanish nobility and the jealousy of the generals of Charles V., nothing remained to him but his courage and repentance. His ability, however, induced the emperor to bestow upon him the command of an army, and to treat him with honor. He was already beyond the confines of France, when Francis I. sent to demand the sword which he bore as constable, and the badge of his order. His answer displays the anguish of his heart:—"The king took from me my sword at Valenciennes, when he gave to D'Alençon the command of the vanguard, which belonged to me: the badge of my order I left under my pillow at Chantelles." His flight was a misfortune to France; the

expedition of Francis into Italy was arrested. Having been appointed to the command of the imperial troops, he made an unsuccessful attack upon Marseilles, but contributed greatly to the victory of Pavia. When Francis was carried a prisoner to Madrid he went there in person, that he might not be forgotten in the treaties between the two monarchs; but Charles V. delayed concluding them, and Bourbon discovered that he could not trust the emperor, who had even promised him his sister in marriage. Compelled to smother his resentment he returned to Milan, maintained possession of Italy by the terror of his arms, and obtained so much authority as to become an object of suspicion to the emperor, who, in order to weaken him, refused to grant him the necessary supplies. In order to prevent the dispersion of his army he led the soldiers to the siege of Rome, the plunder of which city he promised them. He was the first to mount the breach, and was killed by a ball, shot, it is said, by Benvenuto Cellini. His body being conveyed to Gaeta, his soldiers erected over it a splendid monument, afterward destroyed. See Coignet, 'Francis the First and His Times' (1888).

Bourbon, Louis, loo-è, Spanish prelate: b. 1777; d. 19 March 1823. He was the son of the infant Louis, brother of King Charles III. of Spain, and the Duchess of Chinchon. The marriage was concluded with the royal assent: nevertheless, it was doubted, after the death of Charles III., whether the prince would be lawful heir to the throne, if a male descendant of the old line should be wanting. He therefore entered the Church, was appointed archbishop of Seville in 1799, and of Toledo in 1800. A cardinal's hat was also given to him in 1800. After the imprisonment of Ferdinand VII. at Valencay, he joined the party of the Cortes, and became very influential. He offered, in 1814, the constitution of the Cortes to Ferdinand VII. for his signature; and the king having altered his determination, Bourbon lost his favor and was deprived of the archbishopric of Seville. After the events which took place on the insurrection of the army at the island of Leon, he engaged in the revolution, and was president of the provisional junta before which the king swore, at Madrid, 9 March 1820, to abide by the constitution of the Cortes of 1812.

Bourbon, Louis Henri, loo-è òù-rè (DUC DE), French courtier, Prince of Condé: b. Versailles, 1692; d. Chantilly, 27 Jan. 1740. As chief of the Council of Regency and superintendent of the king's education, he robbed the public treasury and extorted huge bribes. Made prime minister in 1723, he persecuted the Protestants, and granted exorbitant privileges to the India Company, in which he held shares. He was entirely controlled by his mistress, the Marquise de Prie.

Bourbon (boor-bôn) Family. The founder of this family, which has governed France, Spain, the two Sicilies, Lucca, and Parma, was Robert the Strong, who, in 861, became Duke of Neustria, and in 866 lost his life in a battle against the Normans. Some trace his descent from Pepin l'Heristal, others from a natural son of Charlemagne, and others from the kings of Lombardy. It is certain that the two sons of this Robert were kings of France. The elder,

BOURBON FAMILY

named Eudes, ascended the throne in 888, and died in 898; the younger, Robert, in 922, and died in 923. The eldest son of this Robert was Hugh the Great, Duke of the Isle of France, and count of Paris and Orleans. Hugh Capet, son of Hugh the Great (great grandson of Robert the Strong), founded the third French dynasty in 987. One of his descendants, named Robert, was the root of the elder line of the dukes of Burgundy, which became extinct in 1361. A descendant of this Robert, Henry of Burgundy, was first regent of Portugal in 1095, where his legitimate descendants became extinct in 1383. Pierre de Courtenay, a descendant of Hugh Capet, in the fifth generation, was father and ancestor of many emperors of Constantinople. The house of Anjou descended from Hugh Capet, in the eighth generation, possessed the throne of Naples for two centuries, and for some time that of Hungary. Another descendant of Hugh Capet, in the 10th degree, founded the house of Navarre, which continued from 1328 to 1425. A second family of Anjou, descended from Hugh Capet, in the 13th degree, gave some distinguished princes to Provence. In the same degree, the younger line of the powerful dukes of Burgundy derived its origin from him. This line became extinct with the death of Charles the Bold, in 1477, whose successor, Maria, married Maximilian, archduke of Austria, and became grandmother of Charles V. Robert, Earl of Clermont, second son of St. Louis, married Beatrice, Duchess of Bourbon. In this way the city of Bourbon l'Archambault, or Bourbon les Bains, in the department of Allier (formerly Bourbonnais), became the birthplace of the house of Bourbon, and Louis I., Duke of Bourbon, son of Robert and Beatrice, its founder. Two branches took their origin from the two sons of this Louis, Duke of Bourbon, who died in 1341. The elder line was that of the dukes of Bourbon, which became extinct at the death of the Constable of Bourbon in 1527, in the assault of the city of Rome. The younger was that of the counts of La Marche, afterward counts and dukes of Vendôme. Of these, Charles, Duke of Vendôme, who died in 1537, and who had been the head of the house of Bourbon since the death of the Constable, had two sons, Anthony and Louis, founders respectively of the royal line of Bourbon, and of the line of Condé. Henry, the son of Anthony, obtained the throne of France as Henry IV., when the house of Valois became extinct in 1589 by the murder of Henry III. His father had obtained the kingdom of Navarre through his wife, who inherited it, and Henry now added it to the French dominions. Anthony's younger brother Louis, Prince of Condé, was the founder of the line of Condé. There were, therefore, two chief branches of the Bourbons—the royal, and that of Condé. The royal branch was divided by the two sons of Louis XIII., the elder of whom, Louis XIV., continued the chief branch, which, through his son, Louis (the dauphin), and grandson, Philip V., was separated into the elder or royal French branch, and the younger or royal Spanish branch; while Philip, younger son of Louis XIII., founded the house of Orleans, when he received the duchy of Orleans from Louis XIV. The kings of the elder or French line of the house of Bourbon are as follows: Henry IV., Louis XIII., XIV., XV., XVI., XVII., XVIII., and Charles X. The

house of Bourbon consists of the following branches and members:

A. The Elder French Royal Line of Bourbons as Distinguished from the Younger Branch or House of Orleans. The last sovereigns of this line were three brothers, Louis XVI., Louis XVIII., and Charles X. (Louis XVII., son of Louis XVI., never obtained the crown), all of whom were grandsons of Louis XV. Louis XVIII. had no children, but Charles X. had two sons, namely: Louis Antoine de Bourbon, Duke of Angoulême, who was dauphin till the revolution of 1830, and died without issue in 1844, and Charles Ferdinand, Duke of Berry, who died 14 Feb. 1820, of a wound given him by a political fanatic. The Duke of Berry had two children, (1) Louise Marie Thérèse, called Mademoiselle d'Artois, and afterward by marriage Duchess of Parma, died at Venice, 1 Feb. 1864; and (2) Henri Charles Ferdinand Marie Dieudonné, born in 1820, and at first called Duke of Bordeaux, but afterward Count de Chambord. His mother was the Princess Caroline, daughter of Francis I., king of the two Sicilies. Charles X., having abdicated in favor of his grandson Henri above mentioned in 1830, and the dauphin having renounced his claims on the French throne also in favor of the latter, the Count de Chambord was until his death looked upon by his party as the legitimate heir to the crown of France, and was styled by them Henri V.

B. The Branch of the Bourbons Known as the House of Orleans.—This branch raised to the throne of France by the revolution of 1830, and deprived of it by that of 1848, derives its origin, as already mentioned, from Duke Philip I. of Orleans (d. 1701), second son of Louis XIII., and only brother of Louis XIV. By his second wife, Charlotte of the Palatinate, he left as his successor in the dukedom his son Philip, known as Duke of Chartres during his father's lifetime, and was regent of France during the minority of Louis XV. Philip, second Duke, was succeeded by his son, Louis Philip (b. 1703), who married a princess of Baden, and died in retirement in 1752, leaving a son of the same name. Louis Philip, Duke of Orleans, who was born in 1725, and died in 1785. The son of the last-mentioned Duke was Louis Joseph Philip, the Duke of Orleans whose name figures in the first French Revolution, who perished on the scaffold in 1793, after he had laid aside his princely name the year before and assumed that of "Citizen Egalité." He left four children: (1) Louis Philip, before the Revolution Duke of Chartres, after his father's death Duke of Orleans, from 1830 to 1848 king of France, died 26 Aug. 1850, leaving a numerous family; (2) the Duke of Montpensier, who died in England in 1807; (3) the Count de Beaujolais, who died at Malta in 1808; and (4) a daughter, Adelaide, Mademoiselle d'Orleans, born in 1777, died 31 Dec. 1847. The eldest son of King Louis Philip was Ferdinand, Duke of Orleans (b. 1810, d. 1842), who married a daughter of Frederick Louis of Mecklenburg-Schwerin, and left two sons: (1) Louis Philip, Count de Paris, b. Paris, 24 Aug. 1838; and (2) Robert, Duke of Chartres, b. Paris, 1840. Louis Philip having abdicated in favor of the former in 1848, the Count de Paris till his death in 1894 was looked upon by the Orleanists as the true heir to the throne. He was married to his cousin, Isabella, a daughter of the Duke of Montpensier, and left issue.

BOURBON — BOURCHIER

C. The Spanish-Bourbon Dynasty.—In 1700 Louis XIV. placed his grandson Philip, Duke of Anjou, on the Spanish throne, who as Philip V. founded the Bourbon dynasty in Spain. Philip V. was succeeded in 1746 by his son, Ferdinand VI., who, dying in 1759 without heirs, was succeeded by his brother, Charles III. To him succeeded (1788) his son Charles IV., who, in 1808, resigned the throne in favor of a successor nominated by Napoleon, and died at Naples in 1819. His son Fernando, Prince of the Asturias, obtained the crown on the fall of Napoleon, and reigned as Ferdinand VII., dying 29 Sept. 1833, and leaving behind him two daughters by his third marriage, the elder of whom succeeded him as Isabella II. She was married, in 1846, to her cousin Francisco de Assis. In 1868 she had to leave Spain in consequence of the revolution, and in 1870 she renounced her claims to the throne in favor of her son Alphonso, who became Alphonso XII., and died in 1885, his son, Alphonso XIII., succeeding him.

D. The Royal Line of the Two Sicilies.—The Two Sicilies being then a possession of the Spanish monarchy, in 1735 Don Carlos, the younger son of Philip V. of Spain, obtained the crown and reigned over Sicily and Naples as Charles III. In 1759, however, he succeeded his brother Ferdinand VI. on the Spanish throne, when he transferred the Two Sicilies to his third son Fernando (Ferdinand IV.), on the express condition that this crown should not be again united with Spain. Ferdinand IV. had to leave Naples in 1806; but after the fall of Napoleon he again became king of both Sicilies under the title of Ferdinand I. He was succeeded by his son Francis I in 1825; Francis was succeeded by his son Ferdinand II. in 1830; and the latter was succeeded by his son Francis II. in 1859, who was deprived of the kingdom in 1860.

E. The Ducal Line of Parma.—This line, like that of the Two Sicilies, was founded by a son of Philip V. of Spain, namely: Don Philip, his youngest son, who obtained the duchies of Parma and Piacenza in 1748. Louis, grandson of Don Philip, obtained Tuscany likewise (1802), with the title of king of Etruria. The family did not long retain this honor, however, being soon forced by the power of France to give up not only Etruria, but also Parma and Piacenza; and it was not till 1847 that there was again a Bourbon Duke of Parma. In 1859 the reigning Duke, Robert, had to leave his dominions, which were soon incorporated in the kingdom of Italy. See Coiffier Demoret, '*Histoire du Bourbonnais et des Bourbons*' (1824); Achaintre, '*Histoire Chronologique et Généalogique de la Maison Royale de Bourbon*' (1825); Coxé, '*Memoirs of the Kings of Spain of the House of Bourbon*' (1875); Lehes, '*Généalogie des Bourbons de France, d'Espagne, de Naples, et de Parme*' (1880); Bingham, '*The Marriages of the Bourbons*' (1890).

Bourbon, Isle of. See RÉUNION, ISLE DE LA.

Bourbon-Lancy, lān-sē, a French watering place, department Saône-et-Loire, famous for its thermal springs, containing chloride of sodium and iron. Its situation is notably fine, and by the Romans it was called Aquæ Nisineii or Nisienses. Remains of the Roman baths are still to be seen here, and the town contains a hospital, built by the Marquis d'Aligre, with 400 beds. Pop. about 5,000.

Bourbon-Vendée, vōn-dā, **Napoléon-Vendée,** or, since the dissolution of the Second Empire in 1870, **La Roche-sur-Yon,** a town in France, the capital of the department Vendée, 231 miles southwest from Paris, situated on a hill on the right bank of the Yon. The streets nearly all end in a spacious square, bordered with ranges of fine trees, and surrounded by public monuments and elegant mansions. The parish church, with a peristyle of six Doric columns, and the mairie or mansion-house, an elegant Italian building, are both in the square. Besides these there are an elegant market-house, theatre, and extensive public offices, large barracks, and a small public library. There is an active trade in woolen cloth, and hardware. It was founded by Napoleon I. on the site of the ancient castle of Roche-sur-Yon, destroyed at the Revolution, and received the name of Napoléon-Vendée, which was changed to Bourbon-Vendée at the Restoration.

Bourbon Whisky, a term applied to Kentucky whisky, made from a mixture of corn, rye, and malt, of which the corn constitutes the larger part. In its distillation some of the oils and acids are allowed to remain. These, with age, undergo chemical action, and are converted into aromatic ethers.

Bourbonnais, a province and government of old France, with the title, first of a county, and afterward of a duchy, lying between the Nivernais, Berry, and Burgundy. It now forms the department of the Allier. It derived its name from the small town Bourbon l'Archambault, from which the Bourbon family received their title. Consult Montegut, '*En Bourbonnais et en Forez*' (1880).

Bourbonnais, boor-bōn-nā, Ill., a village in Kaskaskia County, 56 miles south of Chicago, the seat of two important Roman Catholic schools, Notre Dame Academy, and Saint Viator's College, opened in 1865. Pop. 595.

Bourbonne-les-Bains, boor-būn-lā-bān, a town of France, department of Haute Marne, 21 miles east-northeast of Langres, with hot springs, which were resorted to by the Romans. They contain much chloride of sodium, with a temperature which varies from 140° to 150° F., and frequented by some 3,000 invalids annually. The town has a 12th century church, a large military hospital, and interesting ruins of an ancient château.

Bourboule, boor-bool, La, France, a health resort in the department of Puy-le-Dôme, 22 miles southwest of Clermont. It is picturesquely situated amid striking scenery and its mineral thermal springs are visited by over 7,000 persons yearly. Its waters when bottled are extensively exported for medicinal use. Pop. 1,947.

Bourchier, boor'chī-ēr, Arthur, English actor: b. Speen, Berkshire, 22 June 1864. He was educated at Oxford where he was prominent in amateur theatricals and in 1889 went upon the stage. He has played in leading theatres in England and the United States and took the Royalty Theatre in 1895 when he brought out one of his own adaptations, '*The Chili Widow*,' which ran 300 nights, and the Garrick Theatre in 1900, where he produced Barrie's play, '*The Wedding Guest*.'

BOURDALOUE — BOURGEOIS

Bourdaloue, Louis, loo-ē boor-dā-loo, the founder of genuine pulpit eloquence in France: b. Bourges, 20 Aug. 1632; d. Paris, 13 May 1704. He was sixteen when he entered the society of Jesuits and his instructors successively entrusted to him the chairs of polite letters, rhetoric, philosophy, and moral theology. In 1669 he entered the pulpit, and extended his reputation by attacking, with a powerful and religious eloquence, free from the bad taste of the age, the passions, vices, and errors of mankind. The dignity of his delivery, and the fire of his language, made him distinguished, amidst the victories of Turenne and the feasts of Versailles, among the master-spirits of the arts and of literature in the time of Corneille and Racine. Louis XIV. invited him, in 1670, to preach before the court, and Bourdaloue acquitted himself with so much success that he afterward received invitations at 10 different times. After the repeal of the Edict of Nantes, he was sent to Languedoc, in order to explain to the Protestants the doctrines of the Roman Catholic faith, and he succeeded in this difficult business in reconciling the dignity of his office with the rights of mankind. In his latter days he devoted himself to the care of hospitals, prisons, and religious institutions. He well knew how to accommodate his manner to the capacity of those to whom he gave instruction, advice, or consolation. With the simple, he was simple; with the learned, he was a scholar; with free-thinkers, he was a logician; and came off successful in all those contests in which the love of his neighbor, religious zeal, and the duties of his office, involved him. Beloved alike by all; and no consideration could make him give up his openness and integrity of character. His 'Sermons and Moral Discourses' appeared in English (3d ed. 1855); and 'Married Life: Its Obligations and Trials' (1897). See Fengère, 'Bourdaloue, sa prédication et son temps' (1874); Tousserat, 'Etude généalogique sur les Bourdaloue' (1900).

Bourdillon, Francis William, English poet: b. 22 March 1852. He has taught private pupils for many years and as a poet is widely known as the author of the lyric, 'The Night Has a Thousand Eyes.' His published works include 'Among the Flowers' (1878); 'Aucasin and Nicolette' edited and translated (1887); 'Ailes d'Alouette' (1890); 'A Lost God' (1891); 'Sursum Corda'; 'Nephele,' a much admired musical romance (1896); 'Minuscula' (1897).

Bourdon, Sébastien, sā-bās-tē-ōn boor-dōn, celebrated French painter: b. Montpellier, 1616; d. 1671. Being poor and without occupation, he enlisted as a soldier. After receiving his dismissal, he visited Italy, and studied under Poussin and Claude Lorraine. In 1652 he was driven from the French kingdom by the religious troubles, when he was appointed first painter to Queen Christina of Sweden. He afterward became distinguished in his own country by many great works, among which are the following: the 'Dead Christ,' the 'Old Kings of Burgundy in the Senate-house at Aix,' the 'Adulteress.' He had no peculiar manner, but he imitated others. He was a good engraver on copper. He died while engaged in painting the ceiling of the Tuileries.

Bourdon, named after the inventor, a barometer consisting of an elastic flattened tube of metal bent to a circular form and exhausted of air, so that the ends of the tube separate as the atmospheric pressure is diminished, and approach as it increases. The Bourdon is commonly known as the metallic barometer, although the aneroid is also metallic, and both holosteric.

Bourdon de L'Oise, François Louis, français loo-e boor-dōn-dē-lwāz, French revolutionist: b. Saint Remy, about 1750; d. Cayenne, Guiana, after 1797. He figured in the attack on the Tuileries, 10 Aug. 1792, and did much to bring to pass the execution of the king and the fall of the Girondists, but from July 1794, adopted the side of the nobles and clergy. After joining a Royalist club he was proscribed and transported to Cayenne in 1797, where he died not long after.

Bourg-en-Bresse, boorg-ān-brēs, a town of France, capital of the department of Ain, situated 232 miles southeast of Paris, on the Reys-souse and the Cône. It is well built, and ornamented with public fountains, one of which was erected to the memory of Gen. Joubert. On the Promenade du Bastion is a bronze statue of Bichat, the celebrated anatomist, who pursued his early medical studies in the hospital here. The parish church of Bourg-en-Bresse is a handsome edifice of the 16th century. Outside the town is a magnificent hospital, surrounded by gardens; and the beautiful Gothic church of Brou, built by the direction of Margaret of Austria, daughter of Maximilian I. In front of the portal stands a curious elliptical sun-dial, reconstructed by the celebrated astronomer Lalande, who was a native of this place. Bourg-en-Bresse has a library, a museum, a lyceum, seminary, two hospitals, a lunatic asylum, some manufactories of linen and hosiery, tanneries, a cotton-mill, grain market, etc. Its trade in grain, cattle, horses, and wine is considerable.

Bourgelat, Claude, klōd boorz'h'la, French lawyer, founder of the veterinary schools and creator of the art of veterinary surgery in France: b. Lyons, 1712; d. 3 Jan. 1779. He established the first veterinary school in his native town in 1762, and by his works on the veterinary art furnished the world with a complete course of instruction both in its theory and in its practice; they include 'Eléments d'Hippiatrique, ou Nouveaux Principes sur la Connaissance et sur la Médecine des Chevaux' (1750-3); and 'Traité de la Conformation Extérieure du Cheval' (1776).

Bourgeois, Charles Arthur, Baron, shārl ār-tūr boor-zhwā, French sculptor: b. 1838; d. 1886. He was a student of Duret and M. Guillaume. Among the more notable of his works are the 'Arab Washerwoman'; and the 'Greek Actor,' in bronze; 'St. Agatha'; 'The Slave'; and 'Hero and Leander,' in plaster; 'The Delphic Pythos' and several busts in marble, and 'St. Joachim' and 'Religion,' two stone figures for the church of St. Eustache and the Church of the Sorbonne, respectively.

Bourgeois, Leon Victor Auguste, lā-ōn vĕk-tōr ā-goost, French politician: b. Paris, 1851. After holding several positions of importance he became director of the ministry of the

interior in 1886 and in 1887 prefect of police. He was minister of the interior in 1889; minister of public instruction 1892-3, and prime minister 1895-6. He was for a time in 1898 minister of public instruction for the second time, and in 1899 was at the head of the French delegation to the peace conference at The Hague. He has written 'Solidarité' (1897).

Bourgeois, Sir Peter Francis, English painter: b. London, 1756; d. 8 Jan. 1811. At first intended for a military career, he soon determined to become an artist. In 1776 he went on a tour through France, Holland, and Italy, and three years later he exhibited his first picture. Elected A.R.A. in 1787, he became R.A. in 1793, and landscape painter to George III. In 1794 King Stanislaus of Poland in 1791 appointed him his painter and conferred on him the honor of knighthood, and shortly afterward George III. also knighted him. He bequeathed many pictures and a considerable sum of money to Dulwich College.

Bourgeois, bür-jois', a size of printing type larger than brevier and smaller than long primer, used in books and newspapers.

Bourgeoisie, boor-zhwä-zé, a name applied in France to citizens of towns who do not belong to the nobility or clergy, and in a narrower sense to townspeople occupying an independent position — merchants, tradesmen, independent artisans, lawyers, etc. In the early period of the Middle Ages this class was much oppressed, and as a consequence of that it was poor and possessed little culture and refinement. In subsequent centuries it succeeded in raising itself in all these respects, and latterly attaining a position of political equality with the nobility and clergy, came to be spoken of as the "third estate" (*tiers état*). The word is now used in a somewhat vaguer sense than formerly, and may be taken to correspond with the equally vague English appellation the "middle classes."

Bourges, boorzh, France, capital of the department of Cher, 124 miles south of Paris, on the canal of Berry and the Central railroad, in an extensive plain, at the confluence of the Auron and the Yèvre. When the Romans invaded Gaul, it was known as Avaricum, the capital of Bituriges Cubi. It was taken by Cæsar, 52 B.C., and almost all its inhabitants slaughtered. Under the name of Bituriges, it was for 475 years the metropolis of Aquitania. During the Middle Ages, many councils were held here. The French clergy assembled here in 1438 to receive the famous charter known as the Pragmatic Sanction, by which the liberties of the Gallican church were secured. Jacques Cœur and Louis XI. were both born here. The former established here in 1463 a university, where Cujas taught during the 16th century. Bourdaloue, the famous preacher, was born here in 1632. Don Carlos resided here from 1839 to 1845, when he signed the abdication in favor of his son. The trial of Louis Blanc, Albert, and others, took place before the supreme court at Bourges, 7 March to 2 April 1849. The city is partly surrounded by a thick wall, flanked with lofty towers; its streets are irregularly laid out, while the houses are generally mean-looking, with their gables to the street. Among the old buildings which it contains are the magnificent cathedral, larger than Notre Dame de Paris,

and one of the finest Gothic monuments of Europe; the city hall, built at great cost by Jacques Cœur as a dwelling-house, and now occupied as the Palais de Justice; and the palace of the archbishop. The establishments of public instruction, including the imperial college, the theological seminary, and the normal school, are well patronized. Bourges has manufactories of fine and coarse cloths, iron foundries, and tanneries.

Bourget, Paul, pöl boor-zhâ, French novelist: b. Amiens, 2 Sept. 1852. After a brilliant course at the Lyceum of Clermont-Ferrand, where his father was professor of mathematics, and the College of Sainte Barbe, he graduated with high honors in 1872. He began to write in 1873, but it was 10 years before he found his true work, though he contributed, the while, numerous articles to the magazines, and published three volumes of striking verse, 'La Vie Inquiète' (1875); 'Edel' (1878); and 'Les Aveux' (1881). His 'Essais' (1883) was the first indication of his strength. The second series, 'Nouveaux Essais de Psychologie Contemporaine' (1886), was a singularly subtle and exceedingly searching inquiry into the causes of the pessimism then widely prevalent in France. Bourget's first novel, 'L'Irréparable' (1884), was followed by 'Cruelle Enigme' (1885); 'Un Crime d'Amour' (1886); 'André Cornélis' (1887), and 'Mensonges' (1887). The keen insight into the hidden springs of human motive, and the marvelous subtlety of psychological analysis of these stories, together with their clearness and refinement of style, have lifted Bourget into the front rank of contemporary French novelists. His intimate knowledge of English and Italian life, and his travels in Spain and Morocco, gave him the material for 'Sensations d'Italie' (1891); and 'Cosmopolis' (1892); and he recorded his impressions (1894) of travel in the United States. Other novels are 'Le Disciple,' 'Notre Cœur,' 'La Terre Promise,' 'Un Saint,' 'Antigone,' 'Drame de famille' (1900); 'Un homme d'Affaires' (1901); 'La fantôme' (1901). Bourget was admitted to the Academy in 1894.

Bourgoin, Edmé Alfred, éd-mâ ä-l-frâ boor-gwân, French chemist: b. Saint Cyr-les-Colonne, 1836. In 1867 he became chief pharmacist of the Children's Hospital in Paris and has been director of the central pharmacy of the Paris hospitals from 1885. Among his writings are 'Electro-chimie' (1868); 'Chimie organique, Principes de la classification des substances' (1876); 'Traité de Pharmacie galénique' (1880).

Bourgoin, a French town, capital of a canton in the department Isère in southeastern France. It is situated on the River Bourbre and was called by the Romans Bergusium. It contains important paper, linen, and woolen industries.

Bourgoing, Jean François, zhôn fran-swâ boor-gwân, French diplomatist: b. Nevers, 20 Nov. 1748; d. Carlsbad, 20 July 1811. While at a military school in Paris his talents were so marked that he was educated by the government at the University of Strassburg for the diplomatic service. After four years spent in Germany on diplomatic missions he went to Madrid in 1777 and was secretary of legation there

seven years, writing in that time his noted 'Nouveau voyage en Espagne, ou Tableau de l'état actuel de cette monarchie' (1789). In 1791 he was minister plenipotentiary to Spain, minister to Saxony in 1806, and was at various times employed on diplomatic missions to Germany and Holland. Besides the work above named he wrote 'Mémoires historiques et philosophiques sur Pie VI.' (1789).

Bourignon, Antoinette, ān-twān-ēt boo-ryōn, Flemish visionary: b. Lille, 13 Jan. 1616; d. Franeker, 30 Oct. 1680. She was born so ugly that her parents held a consultation to determine whether it would not be better to destroy her as a monster. She was spared, but her infancy was spent in neglect and solitude. The first books she put her hands on were lives of early Christians and mystical tracts, which she read eagerly. She entered a convent and was subsequently in charge of a hospital at Lille, but was obliged to leave on account of her religious vagaries. She held that religion consists in internal emotion and is independent of knowledge or practice. Her views were adopted by large numbers of Protestants and Roman Catholics, and in the 17th and 18th centuries Scottish Presbyterian ministers were for a long time compelled to renounce Bourignonism at their ordination. Among her works are 'Treatise of Solid Virtue' (1699); 'The Light of the World' (1696, in English 1863); 'Restoration of the Gospel Spirit' (1707).

Bourinot, boo're-nōt, Sir John George, Canadian publicist: b. Sydney, Nova Scotia, 24 Oct. 1838; d. 14 Oct. 1902. He was educated at Trinity College, Toronto; founded and edited the *Halifax Reporter*, became clerk of the Dominion parliament in 1880; was created a member of the Order of St. Michael and St. George in 1890; and in 1892 became president of the Royal Society of Canada. His publications include 'The Intellectual Development of the Canadian People' (1880); 'Manual of Constitutional History' (1888); 'Parliamentary Government in Canada' (1892); 'Parliamentary Procedure and Practice' (1884); 'How Canada is Governed' (1895); 'Canada's Intellectual Strength and Weakness' (1893); 'Canada Under British Rule' (1900); 'Cape Breton and Its Memorials of the French Régime' (1892).

Bourke, John Gregory, American military officer: b. Philadelphia, Pa., 23 June 1846; d. 8 June 1896. He was graduated at West Point in 1869, and saw much service against the Indians, rising through various grades to the rank of major. He became an expert in American ethnological lore; was a past president of the American Folk-lore Society, and wrote 'Snake Dance of the Moquis,' 'Medicine Men of the Apaches,' and other books. He distinguished himself on the Mexican border. He was an officer of great courage and ability.

Bourmont, Louis Auguste Victor, loo-ē ā-goost vĕk-tor boor-mōn, (DE CHAISNES COMTE DE), marshal of France: b. 2 Sept. 1773, at the castle of Bourmont in Anjou; d. there 27 Oct. 1846. At an early age he took part in the campaign in La Vendée, at a later period entered the Republican army, and was advanced by Napoleon, under whom he had distinguished himself at Dresden and Nogent, to the rank of general of division. Although he had gone over

to the Bourbons in March 1814, Napoleon, on his return from Elba, gave him a command, which, however, Bourmont resigned before the battle of Ligny, in order to go over to the side of the allies. Some years after, as commander of the army of intervention in Spain, he obtained some brilliant successes. His greatest victory was the conquest of Algiers, which procured him a marshal's staff in 1830. After the revolution of July 1830, he followed the banished dynasty into exile. In 1833 Dom Miguel, king of Portugal, placed him at the head of his troops which were to act against the adherents of Dom Pedro; but he was unsuccessful. He afterward sought to act in the interests of the Carlists in Spain, and when he at last returned to his native country found that he had almost entirely lost his popularity, and accordingly retired for the rest of his life to his estate in Anjou.

Bourne, Edward Gaylord, American educator: b. Strykersville, N. J., 24 June 1860; d. New Haven, Conn., 24 Feb. 1908. He was graduated at Yale in 1883, and was professor of history there from 1895. He wrote 'The History of Surplus Revenue'; was one of the editors of the 'Yale Review'; and published a collection of his writings on historical subjects under the title of 'Essays in Historical Criticism.'

Bourne, George, American clergyman and anti-slavery writer: b. Westbury, Wiltshire, England, 1780; d. New York, 14 Dec. 1845. In 1804 he settled at Harrisburg, Pa., where he set up a printing office. He was an earnest advocate of the total and immediate abolition of slavery, a position which aroused considerable opposition to him, and in 1815 he formed a church composed of non-slaveholders. His ultra-radical views at last obliged him to remove to Germantown. Afterward he resided for intervals at Sing Sing, N. Y., Quebec, and New York, where he founded a paper, *The Protestant Vindicator*. He wrote: 'The Book and Slavery Irreconcilable' (1815); 'Lectures on Ecclesiastical History' (1822); 'Pictures of Quebec' (1830); 'Slavery Illustrated in Its Effects upon Women' (1834).

Bourne, Hugh, founder of the sect of Primitive Methodists in England: b. Fordhays, Staffordshire, 3 April 1771; d. Bemersley, Staffordshire, 11 Oct. 1852. About 1810, some of the Wesleyan Methodists were desirous of renewing the primitive forms of worship and constitution, and wished particularly to revive camp meetings. These practices were considered unadvisable, and accordingly Mr. Bourne and his friends were expelled from the body. They were 20 in number, and Hugh Bourne was acknowledged their elder. The name of Primitive Methodists was adopted in 1812, but by their opponents they were long styled "Ranters." The sect is now a powerful body in England, numbering in 1901, 198,874 members and 1,100 ministers. In the United States it has 74 ministers, 90 churches and 6,549 members. In 1844 Bourne visited the United States, where his preaching excited much attention. He also visited Canada, Scotland, and Ireland, where he met with great success in his work. He published a 'History of the Primitive Methodists' (1823), and founded, in 1824, 'The Primitive Methodist Magazine.'

Bourne, Vincent, 1695-1747. An English poet: b. 1695; d. 2 Dec. 1747. After studying at Westminster, he entered Trinity College, Cambridge, at the age of nineteen. He took his Master's degree in 1721, and was later appointed usher in the Westminster School. His poetical career was not very fruitful, and is best expressed in a volume of Latin verse ('Poemata') published in 1734, and since enlarged and republished. Bourne seems to have possessed some classical charms as a versifier, for both Cowper and Charles Lamb admired his rhymes and even rendered some of them into English. Besides being simple and graceful, as classical poetry invariably was, Bourne's production was characterized by considerable pathos, a thing the earlier classical writers never fell in with. Some of his enthusiastic admirers have even gone so far—rather too far, it seems—as to class Bourne with Tibullus, Propertius, Ansonius, and almost any of the classical writers save Ovid. His epitaphs, however, do deserve special mention. (See 'POEMATA,' ed. Mitford, London, 1840).

Bournemouth, börn'müth, a famous watering-place in the south of England, 30 miles southwest of Southampton, on the English Channel, at the southwest corner of Hampshire, near the boundary of Dorsetshire. It is within the limits of the parliamentary borough of Christchurch, but forms a municipal borough by itself. It is situated on a semicircular bay at the mouth of a small stream, the Bourne, whence it derives its name. It has become very popular as a seaside resort for consumptive and other delicate persons. It is to a large extent laid out in villas and detached houses. The Westover Gardens in the centre of the town are a favorite resort; they include a winter garden, where orchestral concerts are regularly given. There are two piers, three arcades, assembly rooms, baths, etc. The buildings include hospitals, a sanatorium, home for consumptives, and some handsome churches, among the latter being the new Bennett Memorial church and St. Peter's church, both beautiful Gothic buildings. In the churchyard of the latter lie buried William Godwin, Mary Wollstonecraft, and their daughter, the wife of Shelley.

Bournonite, a lead-copper sulphantimonite belonging to the orthorhombic system of crystals. It occurs both crystallized and uncrystallized, has considerable metallic lustre, and generally is of steel-gray color. It is found chiefly in the Karz Mountains, Bohemia, Mexico, Chile, and the United States (in Colorado, Arkansas, and Arizona).

Bourrienne, Louis Antoine Fauvelet de, loo-e äñ-twän fô-ve-lä dé boo-ryèn, French historian and diplomatist: b. Sens, 9 July 1769; d. Caen, 7 Feb. 1834. He was educated with Bonaparte at the school of Brienne, where a close intimacy sprang up between them. On their separation in 1785, when Bonaparte set out to attend the École Militaire in Paris, they vowed an eternal friendship. At the age of 19 he proceeded to one of the German universities, with the view of studying law and languages. He returned to Paris in 1792, and renewed his early friendship with Bonaparte, who employed him in drawing up, along with Gen. Clarke, the text of the Treaty of Campo Formio. From this period Bourrienne's diplomatic career com-

menced. He accompanied Bonaparte as his private secretary on his expedition to Egypt, and afterward continued in that capacity on his elevation to the consulate. In 1804 he was nominated by the emperor his minister-plenipotentiary at Hamburg. In the end of 1813 he returned to France, where he received the appointment of director of the posts, and in 1814 was made prefect of police. On the abdication of Napoleon he paid his court to Louis XVIII., who, on his restoration, nominated him a minister of state. The revolution of July, 1830, and the loss of his private fortune affected him so much that he lost his reason. He was removed to Normandy, and spent the last two years of his life in a lunatic asylum at Caen, where he died. His 'Mémoires sur Napoléon, le Directoire, le Consulat, l'Empire et la Restauration,' edited by Villemarest (1829-31), contain many interesting particulars of the youth of Napoleon, and also of the history of the directory and consulate, although they are blamed for want of accuracy in many points of detail.

Boursault, Edmé, éd-nia boor-sô, French writer: b. 1638; d. Montluçon, 1701. Having gone to Paris and engaged in literature he both gained and lost the favor of royalty, and produced pieces for the stage with permanent success; among others, 'Esope à la Ville,' and 'Esope à la Cour,' which still continue on the stage. His two tragedies 'Marie Stuart' and 'Germanicus' are forgotten. Boursault had the misfortune to quarrel with Molière and Boileau. He wrote a severe criticism on the 'Ecole des Femmes' under the title of 'Le Portrait du Peintre.' Molière chastised him in his 'Impromptu de Versailles.' To revenge himself on Boileau, who had ridiculed him in his satires, he wrote a comedy called 'Satyre des Satyres.'

Bourse. The name applied to a stock exchange in European countries. The most important of these bourses are, naturally, in the principal cities—at Paris, Berlin, Vienna, London, and St. Petersburg. Some of them are lodged in very costly buildings. The Paris Bourse, for instance, is built in Grecian style of architecture, with handsome Corinthian pillars. See EXCHANGE.

Boussa, boos-sa. See BUSSANG.

Boussingault, Jean Baptiste Joseph Dieu-donné, zhôn báp-těst zhô-zěf dye-dôn-nä boo-săn-go, French chemist: b. Paris, 2 Feb. 1802; d. there, 12 May 1887. He was educated at the School of Mines of Saint Etienne. He went to South America in the employment of a mining company, and made extensive travels and valuable scientific researches there. Returning to France he became professor of chemistry at Lyons in 1839, was made a member of the Institute, was appointed to the chair of agriculture in the Conservatoire des Arts et Métiers, in Paris, and then made Paris his chief residence. In 1857 he was made commander and later grand officer of the Legion of Honor. Boussingault published numerous various papers embodying the results of his scientific researches. His works deal chiefly with agricultural chemistry, and include 'Economie Rurale' (translated into English and German) 'Mémoires de Chimie agricole et de Physiologie'; 'Agronomie, Chimie agricole, et Physiologie,' etc.

BOUSSINGAULTITE—BOUVARD

Boussingaultite, boo-săn-gō'-tīt, a native hydrated sulphate of magnesium and ammonia, having the formula $(\text{NH}_4)_2\text{SO}_4 \cdot \text{MgSO}_4 + 6\text{H}_2\text{O}$. It has a specific gravity of about 1.7. It occurs with boracic acid (q.v.) in the Tuscan lagoons, especially at the fumaroles of Mount Cerboli. Artificial crystals are prisms belonging to the monoclinic system. A related mineral occurs in soft, white, granular masses in Sonoma, Cal.

Boustrophe'don, a kind of writing found on Greek coins, and in inscriptions of the remotest antiquity. The lines do not run in a uniform direction from the left to the right, or from the right to the left; but the first begins at the left and terminates at the right; the second runs in an opposite direction, from the right to the left; the third, again, from the left; and so on alternately. It is called *boustrophedon* (that is, turning back like oxen) because the lines written in this way succeed each other like furrows in a ploughed field. The laws of Solon were cut in tables in this manner.

Boutelle, boo-těl', Charles Addison, American legislator: b. Damariscotta, Me., 9 Feb. 1839; d. 21 May 1901. He served in the navy during the Civil War, entering as an acting master, and being promoted to lieutenant for gallantry in action. In 1870 he became the editor of the *Bangor Whig and Courier*. He was elected to Congress in 1882, and held his seat till December, 1900, when he resigned, and was made a captain on the retired list of the navy. He was chairman of the House Committee on Naval Affairs in the 51st, 54th, and 55th congresses and was author of the bill (1890) authorizing the construction of the first modern battleships of the United States navy.

Bouterwek, Friedrich, fréd'rīk bow-tér-vēk, German philosopher: b. 15 April, 1766, at Öker, a village not far from Goslar, in North Germany; d. Göttingen, 9 Aug. 1828. He was at first a follower of Kant, but finally attached himself to Jacobi. His 'Ideen zu einer allgemeinen Apodiktik' was the immediate fruit of his intimate acquaintance with the philosophical views of Fr. H. Jacobi. This work was published in two volumes, 1799. It was afterward completed by the 'Manual of Philosophical Knowledge' (1813), and by the 'Religion of Reason' (1824). In this work, as well as in his 'Aesthetik' (1806-1824), he had to contend with many powerful antagonists. Bouterwek has gained a permanent reputation by his 'Geschichte der neuern Poesie und Beredsamkeit' (History of Modern Poetry and Eloquence) (1801-19), a work which, though unequal in some respects, and in parts, especially in the first volume, partial and superficial, is an excellent collection of notices and original observations, and may be considered one of the best works of the kind in German literature. Among his minor productions, a selection of which he published in 1818, are many essays, which are superior to the best of his larger speculative works; for instance, the introduction to the History, in which he gives an account of his literary labors until that period, with great candor and with almost excessive severity against himself. His 'History of Spanish Literature' has been translated into Spanish, French, and English.

Bouto, boo-tō, or **Tucuzi**, Indian names for the dolphin (*Inia geoffrensis*) of the Amazon.

Bouton, John Bell, American author: b. Concord, N. H., 15 March 1830; d. Cambridge, Mass., 18 Nov. 1902. He edited the *Cleveland Plain Dealer* 1851-5, and was connected with the *New York Journal of Commerce* 1857-89. He contributed for ten years to Appleton's *Annual Cyclopaedia*, and published 'Loved and Lost' (1857); 'Round the Block' (1864); 'Treasury of Travel and Adventure'; 'Round about Moscow' (1887); 'Uncle Sam's Church' (1895); 'Memoirs of General Bell' (1902).

Bouts, Dirk, or **Dierick**, dērk or dē-rīk bowts, Dutch painter: b. Haarlem, about 1410; d. 1475. He was a brilliant colorist and one of the most prominent members of the Flemish school. Among his works are the 'Martyrdom of St. Erasmus' in the Church of St. Peter, Louvain; and the 'Martyrdom of St. Hippolytus' in the cathedral of Bruges.

Bouts Rimés, boo-rē-mā (French), words or syllables which rhyme, arranged in a particular order, and given to a poet with a subject, on which he must write verses ending in the same rhymes, disposed in the same order. Ménage gives the following account of the origin of this ridiculous conceit, which may be classed with the eggs and axes, the echoes, acrostics, and other equally ingenious devices of learned triflers. "Dulot (a poet of the 17th century) was one day complaining, in a large company, that 300 sonnets had been stolen from him. One of the company expressing his astonishment at the number. 'Oh,' said he, 'they are blank sonnets, or rhymes (*bouts rimés*) of all the sonnets I may have occasion to write.' This ludicrous statement produced such an effect that it became a fashionable amusement to compose blank sonnets, and in 1648 a 4to volume of *bouts rimés* was published. Sarrazin's '*Dulot Vaincu, ou la Défaite des Bouts Rimés*,' is an amusing performance.

Boutwell, bowt'well, George Sewell, American statesman: b. Brookline, Mass., 28 Jan. 1818; d. Groton, Mass., 27 Feb. 1905. He was admitted to the bar in 1836; served in the State legislature in 1842-51; governor of Massachusetts 1851-2; was an organizer of the Republican party in 1854, and appointed the first commissioner of the newly established Department of Internal Revenue in 1862. He was representative in Congress 1863-9; one of the managers of the impeachment trial of President Johnson; secretary of the treasury in 1869-73; and a United States senator in 1873-9. Besides numerous speeches he published 'Educational Topics and Institutions' (1859); several works concerning taxation; 'The Constitution of the United States at the End of the First Century' (1896); 'Reminiscences of Sixty Years in Public Affairs' (1902). After 1898 he was especially prominent as a leader of the Anti-Imperialists and vigorous opponent of the Philippine policy of the administration.

Bouvard, Joseph Antoine, zhō-zěf ān-twān, French architect: b. Saint-Jean-de-Bournay, 19 Feb. 1840. He was a pupil of Constant Dufeux, whom he assisted in his work connected with the Panthéon, the Law School, and the Palace of the Luxembourg. He was appointed inspector of

public works in Paris, and, in 1879, was city architect, making himself famous by his work on the Théâtre Lyrique, the Church of St. Lawrence and the barracks of the Republican Guard. He transformed the old grain market into a Bourse; constructed the railway stations of Sainte Etienne and Marseilles; was architect of the Pavilion of the City of Paris at the exposition of 1878; and created the magnificent central dome of that of 1889. He had charge of the decoration of Paris at the time of the visit of the emperor of Russia, and won great popularity by the magnificence of the festivals which he arranged. In June 1897, he was appointed director of the newly created administrative direction of architecture and promenades. He was made an officer of the Legion of Honor in 1889. He took an important part in the preparation for the Universal Exposition of 1900, being director of architectural services and chief of the management of fetes, under M. Picard.

Bouvardia, boo-vâr'dî-ä, a genus of about 25 species of American shrubs or perennial herbs of the natural order *Rubiaceæ*, natives mostly of tropical Mexico, some of Arizona and Texas. Several horticultural varieties are largely cultivated in greenhouses for their terminal cymes of long tubular white, red, or yellow, sometimes perfumed blossoms which are very useful as cut flowers during late fall and early winter. The type species are not cultivated commercially.

Bouvar, or **Bouvard**, boo-vâr, Alexis, Swiss mathematician and astronomer: b. Haute Savoie, 27 June 1767; d. 7 June 1843. He went to Paris about 1785 to study mathematics and astronomy, and in 1793 obtained a position in the Paris Observatory. He is celebrated for his researches in the theory of planetary motions, especially those of Jupiter and Saturn. Later he took up the theory of Uranus, and was the first to suggest that the discrepancies between the old and new observations could only be reconciled by the hypothesis of another undiscovered disturbing planet, an opinion which he retained till his death, three years before the discovery of Neptune. He published '*Nouvelles tables de Jupiter et de Saturne*' (1808); '*Mémoire sur les Observations Météorologiques, faites à l'Observatoire de Paris*.'

Bouvé, Pauline Carrington, American novelist: b. Little Rock, Ark.; married Thomas Tracy Bouvé in 1898. Besides the historical novel '*Their Shadows Before*' (1900) she has published '*La Toison d'Or*' from the French of Amedée Achard (1900).

Bouvet, Joachim, French missionary: b. Mans, about 1662; d. Pekin, China, 28 June 1732. Sent by Louis XIV. to China to study the customs and institutions of that country, he was received with favor at the imperial court at Pekin, employed by the emperor in directing various constructions, and allowed to build a church even within the palace. He returned to France in 1697, with permission to take back with him to China as many missionaries as would undertake the voyage. He presented to Louis XIV. 49 works in the Chinese language, and in 1699 departed again for China with 10 associates, among whom was the learned Parenin. He labored for nearly 50 years with indefatigable ardor to promote the progress of the

sciences in that empire. He gave an account of the state of China in several treatises and letters, and made a dictionary of the language.

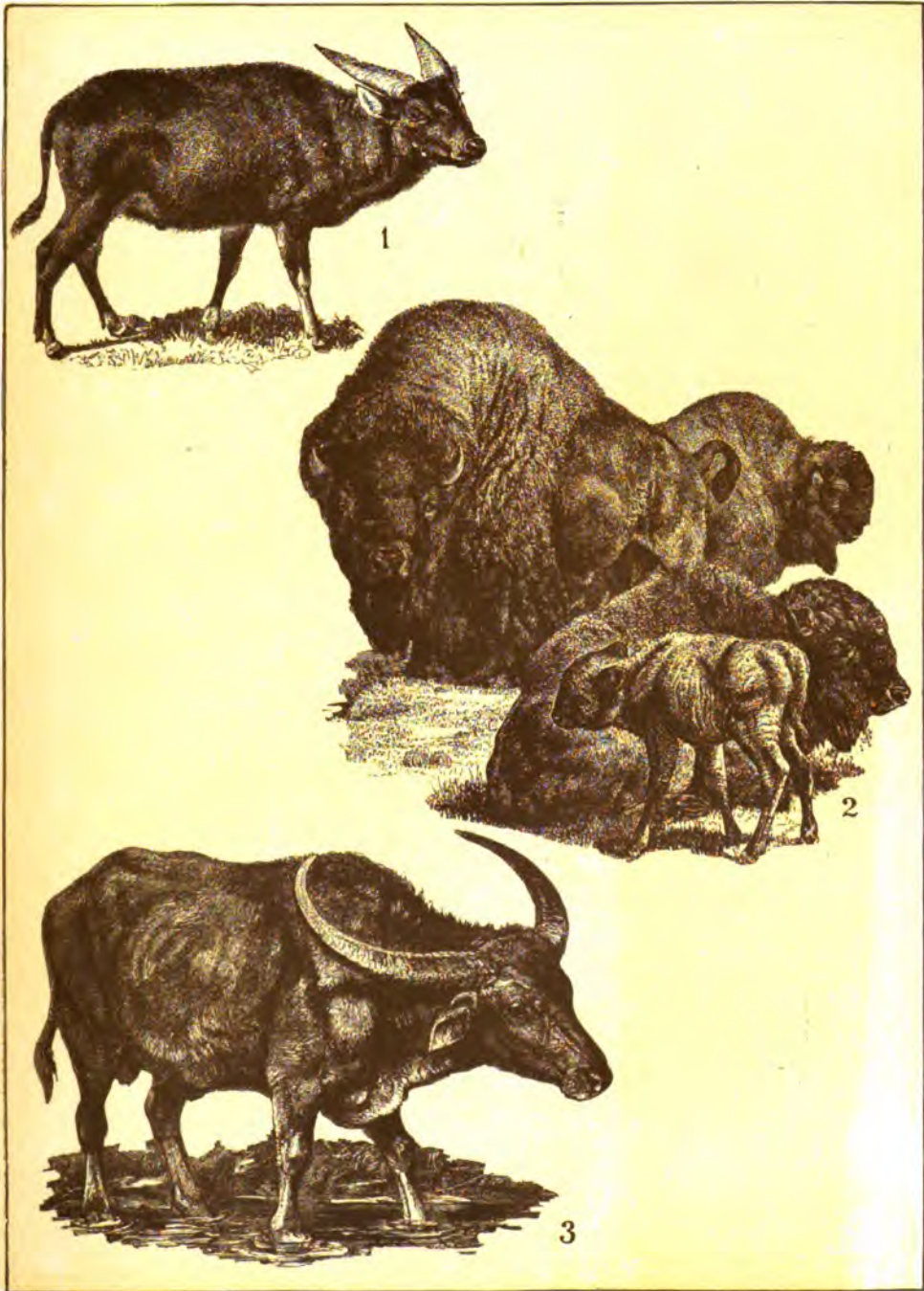
Bouvet, Marie Marguerite, American writer of books for young people: b. New Orleans, 14 Feb. 1865. She has published '*Sweet William*' (1890); '*Little Marjorie's Love Story*' (1891); '*Prince Tip-Tip*' (1892); '*My Lady*' (1894); '*A Child of Tuscany*' (1895); '*Pierette*' (1896); '*A Little House in Pimlico*' (1898); '*Tales of an Old Château*' (1900).

Bouvier, John, American jurist of French birth: b. Codognan, in the department of Gard, 1787; d. Philadelphia, 18 Nov. 1851. He was of a Quaker family, which emigrated to this country and settled in Philadelphia, when he was in his 15th year. He obtained employment for several years in a book store, became a citizen of the United States in 1812, published a newspaper for a short time at Brownsville, in the western part of Pennsylvania, studied law, and was admitted to the bar in 1818. During his studies he made a complete analysis of Blackstone's '*Commentaries*.' In 1822 he began the practice of law in Philadelphia, in which city he resided till his death. He published, in 1839, a '*Law Dictionary*, adapted to the Constitution and Laws of the United States of America, and of the several States of the American Union,' the fruit of 10 years' labor. In 1841 he published a new edition of Bacon's '*Abridgement of the Law*.' His greatest work, published two months before his death, was the '*Institutes of American Law*.'

Bovee, George, American politician: b. Saint James, La., 1840; d. El Paso, Tex., 1903. He was one of the first native whites to join the Republican party. He was elected Secretary of State in 1868, but quarrelled with Gov. Warmoth, the head of the administration, and it was this quarrel and the removal of Bovee by Warmoth which led to the political complications in Louisiana, and the dual State government of 1872 to 1876.

Boves, Jose Tomas, military adventurer in Spanish America; d. 5 Dec. 1814. He was born in Castile, and of the lowest extraction. At the age of 30 he was employed as a naval officer to guard the American coast, but betrayed his trust, and was condemned and imprisoned for bribery and prevarication. After his release, he joined the royal forces, but began to wage war on his own account after the defeat of Cagigal at Maturin. Boves established himself at Calabozo, Venezuela, and with 500 men, many of whom were slaves, defeated Mariño, the dictator of the eastern provinces. He defeated the independents twice, slaughtered all his prisoners, and gained for his army the name of the Infernal Division. He was defeated by Rivas, and a part of his army, being taken captive, were put to death; but he quickly recovered his strength, resumed the offensive, and in 1814 defeated Bolivar and Mariño at La Puerta. The struggle was prolonged with alternate successes and reverses, and with incessant cruelties. Boves advanced toward Valencia, where the independents were strongly fortified, and after a blockade, forced the town to capitulate. To give a more solemn sanction to the terms of capitulation, a mass was celebrated between the two armies,

BOVIDAE.



1. Celebes Wild Ox or Anoa.

2. North American Bison or Buffalo.

3. Indian Domestic Buffalo.

and at the moment of the elevation, the royalist general promised a strict and faithful observance of the treaty; but having entered the town, he ordered the republican officers and a large number of the soldiers to be shot. Boves was again victorious at Anguita, and obliged Bolívar to retreat to Carthagena. He now entered Caracas, and shortly after gained a new victory, and killed or wounded 1,500 of the independents. His last triumph was at Urica; he was struck by a lance, and died upon the field of battle. His funeral was celebrated amid bloody commotion, while his troops were putting to death the men, women, and children whom they had made prisoners.

Bovey, Henry Taylor, Canadian engineer: b. Devonshire, England. He was educated at Cambridge University and took up the profession of civil engineering. He was appointed professor of civil engineering and applied mechanics in McGill University in Montreal in 1887 and has since lived in Canada. He is a member of many professional societies both in England, Canada, and the United States, and is the author of 'Applied Mechanics' (1882); 'Theory of Structures and Strength of Materials' (1893); 'Hydraulics' (1895).

Bovidæ, one of the most extensive and important families of mammals, characterized pre-eminently by the possession of hollow persistent horns in both sexes, and the form of digestive apparatus which involves chewing the cud. The family consists of the large herbivorous animals with cloven hoofs, which are most prominent as game, and which have supplied nearly all our domestic animals, except horses and camels. This family includes all of the ruminants, except the deer, giraffes, and pronghorn, and embraces five sections or sub-families, namely: the antelopes (*Antilopinae*); the goats (*Caprinae*); the sheep (*Ovinae*); the musk-ox (*Ovibovinae*); and the oxen (*Bovinae*). Although in a general way the members of these sections are easily recognized, all are connected by intermediate examples whose position is assigned with difficulty, so that a general structural likeness covers even such different examples as the delicate antelopes and the heavy cattle. A conspicuous common character is found in the nature of the horns, which gave the name *Cavicornia* to the group in the early classifications. These horns are always in pairs, and consist of sheaths of horn growing from the skin and covering "cores," which are protuberances of bone from the frontal bones of the skull, varying in form in the different groups, and contain hollow spaces, which are extensions of the frontal sinuses. These horns begin to grow soon after the animal is born, and increase until they attain their full size with the maturity of the individual; with very few exceptions they are worn by both sexes, but those of the males, especially among sheep, are often considerably larger and more effective as weapons than those of the females. No animal outside of this family possesses hollow horns of this character, except the pronghorn, and in this case they are branched, and are annually shed, neither of which conditions ever occurs among the Bovidæ.

The Bovidæ are distributed throughout the whole world, except Australia and South America. They are in the main gregarious, and where

the nature of their habitat permits, as on the plains inhabited by most antelopes and certain bison, they gather into enormous herds. The sheep, goats, and some of the antelopes, are confined to mountain ranges; most of the oxen dwell in forests; and the musk-ox is restricted to Arctic lands. Most of these animals, however, show great adaptability to new climates and conditions, have a high degree of variability, and are susceptible of taming and domestication. In consequence they have furnished to mankind the most important of his aids to agriculture, as the cattle, sheep, and goats, which he has been able to take with him to every part of the world, to train to his service, or to develop by careful improvement into the great resources of food and clothing, which they have become. See **DOMESTIC ANIMALS**, and the names of the various groups and species composing the family.

Bovines, Flanders, a village within a short distance of Lille, celebrated for the memorable victory gained by Philip Augustus of France, over Otho IV. of Germany, and his allies, 27 July 1214. Philip of Valois defeated here, in 1340, 10,000 English troops; and, on 17 and 18 May 1794, the French here defeated the Austrians.

Bovino, Italy, (anciently *Bovinum*), a fortified town in the province of Foggia, 20 miles south southwest of Foggia, near the Cervaro; the seat of a bishopric, suffragan to Benevento. It has a cathedral, two parish churches, and several convents. The Spaniards were defeated here by the Imperialists in 1734. Pop. 7,613.

Bow, the earliest instrument known, and the most generally diffused, among all savage and barbarous people for the propulsion of missiles in the chase or in war. There are two forms of the bow, the long-bow and the cross-bow, the former of which is the earlier, the more general, and by far the more celebrated, as being the weapon of the famous English archers of the Middle Ages, who were popularly said to carry at their belts the lives of four-and-twenty Scots, that being the number of clothyard arrows in their quivers. The long-bow passed out of use as a military weapon with the improvement of firearms; but there were men yet alive in the beginning of this century who remembered that the Highlanders, in the Jacobite rising of 1715, carried bows and arrows; and at the capture of Paris, in 1814, Bashkirs and Circassians, in the service of Russia, were seen in the streets of that city, armed in chain-mail, with bow-cases and quivers. Some of the North American Indians, especially the Comanches and the Apaches were very expert with the bow. Whatever the substance of which the bow is made, whether of wood, horn or steel, its figure is nearly the same in all countries, having generally two inflexions, between which, in the place where the arrow is fixed, is a right line. The Grecian bow was somewhat in the form of the letter Z: in drawing it, the hand was brought back to the right breast, and not to the ear. The Scythian bow was distinguished for its remarkable curvature, which was nearly semi-circular; that of the modern Tartars is similar to it. The materials of bows have been different in different countries. The Persians and Indians made them of reeds. The Lycian bows were made of

BOW BELLS—BOWDICH

the cornel-tree; those of the Ethiopians of the palm-tree. That of Pandarus was made from the horn of a mountain goat, 16 palms in length: the string was an oxhide thong. The horn of the antelope is still used for the same purpose in the East. The long-bow was the favorite national weapon in England. The battles of Crecy (1346), Poitiers (1356), and Agincourt (1415) were won by this weapon. It was made of yew, ash, etc., of the height of the archer. The arrow being usually half the length of the bow, the clothyard was only employed by a man six feet high. The arbalest, or cross-bow, was a popular weapon with the Italians, and was introduced into England in the 13th century. The arrows shot from it were called quarrels.

Of the power of the bow, and the distance to which it will carry, some remarkable anecdotes are related. Xenophon mentions an Arcadian whose head was shot through by a Carduchian archer. Stuart mentions a random shot of a Turk, which he found to be 584 yards; and Mr. Strutt saw the Turkish ambassador shoot 480 yards in the archery ground near Bedford Square. Lord Bacon speaks of a Turkish bow which has been known to pierce a steel target or a piece of brass two inches thick. In the journal of King Edward VI. it is mentioned that 100 archers of the king's guard shot at a one inch board, and that some of the arrows passed through this and into another board behind it, although the wood was extremely solid and firm. It has been the custom of many savage nations to poison their arrows. This practice is mentioned by Homer and the ancient historians; and we have many similar accounts of modern travelers and navigators from almost every part of the world. Some of these stories are of doubtful authority, but others are well authenticated. Some poison obtained by Condamine from South American savages produced instantaneous death in animals inoculated with it. The poisoned arrows used in Guiana are not shot from a bow, but blown through a tube. See AIR-GUN; also ARCHERY.

In music it is the well-known implement by the means of which the tone is produced from viols, violins, and other instruments of that kind. It is made of a thin staff of elastic wood, tapering slightly till it reaches the lower end, to which the hairs (about 80 or 100 horse-hairs) are fastened, and with which the bow is strung. At the upper end is an ornamented piece of wood or ivory called the nut, and fastened with a screw, which serves to regulate the tension of the hairs. It is evident that the size and construction of the bow must correspond with the size of the species of viol-instruments from which the tone is to be produced.

Bow Bells, the peal of bells belonging to the Church of St. Mary-le-Bow, Cheapside, London, and celebrated for centuries. One who is born within the sound of Bow Bells is considered a genuine cockney.

Bow Island, an island in the South Pacific Ocean, near the eastern extremity of the Society Isles, in lat. 18° 6' S. and lon. 140° 51' W. It is a low island, of coral formation, about 30 miles in length and 5 miles in breadth. It derives its name from its shape, which is bow-like, the outer edge only being of land, and encircling a great central lagoon. It was discovered by Bougainville in 1768.

Bow Legs, a deformity of the legs in which the knees are far apart and the leg is bowed outward. It is technically known as *genu varum* and is the opposite of knock-knees, or *genu valgum*. Two forms are common, in one the bow is a gradual one, practically the entire leg being bent, in the other the bend takes place quite suddenly just above the ankle. Sometimes the bow is front and back instead of sideways. Bow leg is the commonest of the deformities, making fully 10 per cent of all orthopedic cases. It may be congenital, it is usually due to rickets (q.v.) and perhaps may occur in strong and heavy children who stand too much while very young. In the majority of cases it is outgrown, but in pronounced instances it can be cured only by prolonged correction by means of appropriate braces.

Bow-window, in architecture, properly a window forming a recess or bay in a room, projecting outward, and having for the outline of the plan a segment of a circle. This term is, however, often confounded with bay-window and oriel, which properly designate, the first a similar window with a straight-sided plan, and the second a projecting window not on the ground-floor, and supported on a corbel or other molded base.

Bow-wood. See OSAGE ORANGE.

Bowdich, Thomas Edward, African traveler, one of the victims of the attempts to explore the interior of the Dark Continent: b. Bristol, June 1791; d. 10 Jan. 1824. He was sent to Oxford, but was never regularly matriculated. At an early age he married, and engaged in trade at Bristol. Finding the details of business irksome, he obtained the appointment of writer in the service of the African Company, and set sail for Africa in 1814. In 1816, it being thought desirable to send an embassy to the negro king of Ashantee, Bowdich was chosen to conduct it; and he executed with success the duties of his situation. After remaining some time in Africa he returned home, and soon after published his 'Mission to Ashantee, with a Statistical Account of that Kingdom, and Geographical Notices of other Parts of the Interior of Africa.' Having offended the company in whose service he had been engaged, and having, therefore, no prospect of farther employment, yet wishing ardently to return to Africa for the purpose of visiting its hitherto unexplored regions, Bowdich resolved to make the attempt with such assistance as he could obtain from private individuals. He, however, previously went to Paris to improve his acquaintance with physical and mathematical science. His reception from the French literati was extremely flattering. A public eulogium was pronounced on him at a meeting of the Institute, and an advantageous appointment was offered him by the French government. To obtain funds for the prosecution of his favorite project, Bowdich also published a translation of 'Mollien's Travels to the Sources of the Senegal and Gambia,' and other works; by the sale of which he was enabled, with a little assistance from other persons, to make preparations for his second African expedition. He sailed from Havre in August 1822 and arrived in safety in the river Gambia. A disease, occasioned by fatigue and anxiety of mind, here put an end to his life.

BOWDITCH — BOWDOIN

Bowditch, Henry Ingersoll, American physician: b. Salem, Mass., 9 Aug. 1808; d. 14 Jan. 1892. He received his degree at Harvard in 1832; was professor of clinical medicine at Harvard in 1859-67; chairman of the State Board of Health in 1869-79; and president of the American Medical Association in 1877. He announced the law of soil moisture as a cause of consumption in New England; introduced several new features in surgical treatment, and was author of many general and special works in medical science. He was the first to practise chest-puncture in cases of pleurisy.

Bowditch, Henry Pickering, American educator: b. Boston, Mass., 4 April 1840. He was graduated at Harvard in 1861, and subsequently studied chemistry and medicine, and, after the Civil War, in which he reached the rank of major in the Union service, he took a special course in physiology in France and Germany. In 1871-6 he was assistant professor of physiology in the Harvard Medical School, and in 1876 was elected to the full chair but resigned on 9 May 1906. He is a member of the American Academy of Arts and Sciences, as well as of numerous medical societies, and has published many papers on physiological subjects.

Bowditch, bow'dich, Nathaniel, American mathematician: b. Salem, Mass., 26 March 1773; d. Boston, 16 March 1838. The son of a cooper he went to school till 10 years of age, when he entered his father's shop. Later he was apprenticed to the ship chandlery business, which he followed till he went to sea. He studied incessantly, during intervals of business and in morning and night hours. Mathematics was the science in which he was most interested, and he mastered algebra and Latin unaided. He had a teacher for French, and in later life he took up Spanish, Italian, and German. He learned navigation and was an omnivorous reader. In 1795 he made his first voyage as clerk, later as supercargo, and in the course of five long voyages rose to be master. Harvard College gave him the degree of M.A. and offered him the professorship of mathematics, which he declined, as he also did a similar offer from the University of Virginia, and the United States Military Academy. Between 1814 and 1817 he translated Laplace's '*Mécanique Céleste*,' and appended to it an elaborate commentary. He contributed largely to scientific periodicals, his articles being principally on mathematics and astronomy. He was admitted as a Fellow to the Royal Society of London.

Bowditch's Practical Navigator, a work on navigation of the highest value and utility to seamen, written by Nathaniel Bowditch (q.v.) and published in 1802.

Bowdler, bō'dler, Thomas, English expurgator: b. near Bath, 11 July 1754; d. Rhyddings, South Wales, 24 Feb. 1825. At the age of 16 he went to St. Andrews to study medicine, but graduated M.D. at Edinburgh in 1776, and, after some years of travel, settled in London, devoting himself mainly to charitable work. He lived for 10 years at St. Boniface, Isle of Wight, and for the last 15 years of his life at Rhyddings, near Swansea. In 1818 he published '*The Family Shakespeare*,' in 10 volumes; in which nothing is added to the original text; but those words and expressions are

omitted which cannot with propriety be read aloud in a family. The work had a large sale, and was long popular, despite the ridicule it brought down upon the head of its over-prudish editor, who had the happiness or unhappiness to add permanently to the English tongue the word 'bowdlerism' as a synonym for senseless expurgation. The last years of Bowdler's life were given to the task of preparing a purified edition of Gibbon's '*History*.'

Bowdlerism. See **BOWDLER**, THOMAS.

Bowdoin, bō'dōn, James, American statesman: b. Boston, 8 Aug. 1727; d. there, 6 Nov. 1790. Graduating from Harvard in 1745, he inherited in 1747 a large fortune from his father, a wealthy merchant, and was thus provided with means to gratify his taste for scientific investigation. In 1751 he visited Franklin, who explained to him the results of his electrical researches. A correspondence ensued that lasted many years, and Franklin read Bowdoin's letters before the Royal Society of London. He was a prominent figure in the politics of his State, being elected a member of the General Court 1753-6, and of the Council 1756-69. He presided over the Constitutional Convention in 1779, and to him was due the form of some of the most admired sections of the constitution it drew up. As governor, 1785-6, he quelled Shay's Rebellion. In 1788 he was a delegate to the Federal Constitutional Convention. He was a Fellow of Harvard College from 1779 to 1785 and to it he left a legacy of £400. A founder and first president of the American Academy of Arts and Sciences, he bequeathed it his very valuable library. The degree of Doctor of Laws was conferred upon him by the universities of Yale and Edinburgh. Bowdoin College in Brunswick, Me., was named in his honor. He wrote a poetical paraphrase of Dodsley's '*Economy of Human Life*' (1759), and several papers which may be found in the first volume of the American Academy's '*Memoirs*.' To the '*Pietas et Gratulatio*,' a volume of poems published by Harvard on the accession of George III., he contributed an English poem and two Latin epigrams.

Bowdoin, James, American statesman (son of the preceding): b. Boston, 22 Sept. 1752; d. Naushon Island, Buzzard's Bay, 11 Oct. 1811. He was graduated from Harvard in 1771, studied at the University of Oxford, and traveled in Europe. At the outbreak of the Revolution he returned home and became successively a member of the Assembly, the State Senate, and a delegate to the State Constitutional Convention, 1779. In Jefferson's administration he was appointed minister plenipotentiary at the court of Spain, and associate minister to France. During his residence abroad he accumulated a valuable library, a collection of paintings and drawings by old and modern masters, a cabinet of minerals and fossils, together with models of crystallography, all of which he bequeathed to Bowdoin College, of which he was the earliest patron. During his lifetime he gave it 6,000 acres of land and £1,100, and at his death it became, by will, his residuary legatee. He translated Daubenton's '*Advice to Shepherds*,' and was the anonymous author of '*Opinions respecting the Commercial Intercourse Between the United States and Great Britain*.'

BOWDOIN COLLEGE—BOWER

Bowdoin College, located at Brunswick, Me. It is the oldest institution of higher learning in the State, having been incorporated in 1794, while Maine was a part of Massachusetts. It was named for James Bowdoin, governor of Massachusetts, whose son gave largely to the college. It was not opened to students until 1802. It is under the general patronage of the Congregational Church, but is non-sectarian in government and instruction. In addition to the college proper, the organization includes the Medical School of Maine, founded in 1820. The college confers the degree of A. B. for the completion of the regular four years' course. The work is almost entirely elective after the freshman year. A course in shopwork was added to the curriculum in 1902-3. The campus consists of 40 acres, one mile from the Androscoggin River, about three miles inland from Casco Bay. The buildings include Massachusetts Hall (the original building), King Chapel. Memorial Hall, Mary Francis Searle Science Building, Walker Art Building, Hubbard Hall (the library), Adams Hall, Observatory, and the Sargent Gymnasium. The library, in 1910, contained 76,000 volumes; the students numbered 308, and the faculty 64. A number of Bowdoin graduates have been distinguished in literary and public life; among them are Longfellow and Hawthorne, Thomas B. Reed, and Melville Weston Fuller (chief justice).

Bow'ell, Sir Mackenzie, Canadian statesman: b. Rickingham, Suffolk, England, 27 Dec. 1823. He went to Canada when 10 years old and learned the printing trade, becoming editor of the *Belleville Intelligencer*. He served in the Canadian militia. After the Confederation he served in the Dominion House of Commons for 25 years. In 1878 he entered the MacDonald Cabinet, and in 1894 formed an administration of his own. He relinquished Cabinet office in 1896, and in 1897 he declared his independence of all party affiliation.

Bowen, bō-en, Francis, American educator and author: b. Charlestown, Mass., 8 Sept. 1811; d. Cambridge, Mass., 21 Jan. 1890. He was graduated from Harvard in 1833, and for a time taught mathematics in Phillips-Exeter Academy. He became instructor in natural philosophy and political economy at Harvard, 1835; studied in Europe, 1839-41, meeting Sismondi and De Gerando. Returning to Cambridge in 1843 he took charge of the 'North American Review,' as editor and proprietor, and conducted it with great ability for nearly 11 years. On account of his having taken the unpopular side in the 'Review' on the Hungarian question, the overseers of Harvard refused to concur with the corporation in appointing him professor of history in 1850. When Dr. Walker became president of Harvard in 1853, Prof. Bowen was elected Alford professor of natural religion, moral philosophy, and civil polity, and held that chair until 1888, when he became professor emeritus. He opposed the doctrines of Darwin and accepted those of Sir William Hamilton. He was a clear, forceful, independent thinker, and possessed a style notable for its energy and precision. As a writer he was most industrious, treating with success widely varying topics. The following is a selected list of his publications: 'Documents of the Constitutions of England and America, from Magna

Charta to the Federal Constitution of 1789' (1854); 'The Principles of Metaphysical and Ethical Science applied to the Evidences of Religion' (1855); 'Dugald Stewart's Philosophy of the Human Mind, with Critical Notes' (1854); 'Principles of Political Economy' (1856); 'The Metaphysics of Sir William Hamilton' (1862); 'De Tocqueville's Democracy in America, edited with notes' (1862); 'Logic, or the Laws of Pure Thought' (1864); 'American Political Economy' (1870).

Bowen, Henry Chandler, American editor and publisher: b. Woodstock, Conn., 11 Sept. 1813; d. 24 Feb. 1896. He received a common school education and entered business. In 1848 he helped to found the 'Independent,' in New York, becoming, in 1861, its editor and proprietor, and making the paper famous for its advanced views on public topics.

Bowen, Herbert Wolcott, American diplomatist (son of the preceding): b. Brooklyn, N. Y., 29 Feb. 1856. He was educated at Yale College and at the Columbia Law School. He was appointed United States consul at Barcelona in 1890 by President Harrison, and in 1894 President Cleveland made him consul-general of the same port. At the opening of the Spanish-American war he remained at his post as long as was practicable, and at the conclusion of the war was appointed by President McKinley consul-general at Teheran, and in May 1901 minister plenipotentiary to Persia. He was subsequently appointed minister to Venezuela, but was retired in 1905. He has published 'Verses'; 'Losing Ground'; 'In Divers Tones'; 'De Genere Humano'; 'International Law.'

Bowen, John Wesley Edward, American theologian: b. New Orleans, 3 Dec. 1855. He graduated at Boston University in 1878, and in 1885 received the degree of Ph.D., from the University of New Orleans. He held pastorates in Newark, N. J., Boston, Baltimore, and Washington, 1882-92. He was professor of church history and systematic theology in Morgan College, Baltimore, 1888-92; professor of Hebrew, Howard University, Washington, 1891-92, and since 1893 has been president and professor of the history of theology in Gammon Theological Seminary, Atlanta, Ga. Publications: 'Sermons'; 'Africa and the American Negro'; 'Discussions in Philosophy and Theology'; 'Struggle for Supremacy between the Church and State during the Middle Ages'; 'The Catholic Spirit of Methodism'; 'The Theology and Psychology of the Negro Plantation Melodies'; 'The Psychological Process in the Revelation of Doctrine'; 'The Religious History of the Negro'; 'The Education of the Negro', etc. Dr. Bowen is a recognized leader in all movements for the advancement of the Negro.

Bow'er, Archibald, Scottish writer: b. near Dundee, 17 Jan. 1686; d. London, 3 Sept. 1766. He entered the order of Jesuits in 1706. At Macerata, in Italy, according to his own account, he was counselor or judge of the Inquisition. In 1726 he quitted the order of Jesuits and went to Perugia, whence he fled secretly to England and professed himself a convert to the Protestant faith. He obtained respectable patronage, was engaged as a tutor in a nobleman's family, and employed by the

BOWER-BIRDS — BOWERS

bookellers in conducting the 'Historia Literaria,' a monthly review of books, and in writing a part of the 'Universal History,' in 6o vols. 8vo. The money which he gained by these occupations he is believed to have given or lent to the society of the Jesuits, and thus to have purchased his re-admission among them about the year 1744. Subsequently repenting of the engagement he had made with his old associates, he claimed and recovered the property he had advanced. In 1748 he published the first volume of a 'History of the Popes,' which was continued to seven volumes and characterized by the utmost zeal against Roman Catholicism. His money transactions with the Jesuits being at last brought to light, he was generally believed to be a man destitute of moral or religious principle; so that toward the end of his life he had hardly a friend or patron left except Lord Lyttelton. He is said to have died a Protestant.

Bower-birds, a group of birds of the bird-of-paradise family, dwelling in Australia and the neighboring islands, remarkable for the construction of bowers or "play-houses" in addition to their ordinary breeding-nests. All are of moderate size, of dark and plain plumage, having few ornaments of color and none of feather characteristic of other birds-of-paradise, although, like them, they are of aboreal habits, feed mainly upon fruits, and construct rather rude nests for their eggs in branches of trees. In addition to the nest proper, the males of all the bower-birds build upon the ground bowers or shelters of various forms, which serve as places for assembling and holding the series of antics or dances, in rivalry with each other, and as a display of their respective attractions to the females, in which these birds indulge during the season of courtship. These buildings always occupy a little space in the forest which is first carefully cleared of every obstruction, so that they look like small cultivated lawns. A few species are content with such a lawn, but most erect buildings which vary in form according to the species. The satin-bird (*Ptilorynchus violaceus*) of southern Australia forms of twigs, a few inches in length, an oblong, dome-shaped hut, open at each end and floored with twigs. The sides of this hut are formed of slender twigs, planted upright, and leaning inward to form a roof. Its floor, and the ground all about it, are strewn with highly colored feathers and bright objects of all sorts, which the bird brings, day by day, sometimes from a great distance, to add to his store, replacing dull or faded pieces with something better as he finds them. The people of the region are accustomed to search these collections for such lost articles as bits of bright jewelry, which the birds frequently seize and take there. The spotted bower-birds, of the genus *Chlamydera*, form "runs" or avenues about three feet long, formed of a dense platform of sticks fenced in on each side by a hedge of upright twigs, and place near it hundreds of white pebbles, pieces of bleached bone, shells, and bright objects, which they rearrange with incessant activity. One species gathers snail-shells exclusively. Another species make several little huts—a miniature of a village of the black fellows. The most remarkable of these structures, however, is that of a New Guinea species (*Amblyornis inornatus*) which is called "gardener-bird" in the

books. This bird clears a space around the base of a small tree, and then piles up around its base a cone of moss, about 18 inches in height. Outside of this, and at a distance of four or five inches, it plants a circle of twigs, some of which are two feet in length, so that they form a conical hut, covering and enclosing the inner cone. Two doors are left in this outer hut at opposite sides. The twigs of which this "wigwam" is composed are always the thin stems of an epiphytall orchid, which retain their leaves and remain alive and blooming for a long time; and it is believed by Dr. Beccari, who first described this bird, that the orchids are chosen because they will remain alive. He says, however, that this apparent attempt to provide flowers is not restricted to the cabin. Directly in front of the entrance is made a miniature meadow of soft moss, which is kept smooth and clean, and upon which are scattered flowers and fruit of different colors, bright fungi, and brilliantly colored insects, so that the place reminds one of an elegant little garden. Moreover, when these objects have been exposed so long so as to become wilted they are taken away and replaced by others, so that it seems impossible to believe that the birds do not take a real delight in the freshness of their flowers, and the brightness and color of their ornaments. The activity and curiosity of all these bower-birds are strong characteristics, and they seem to derive great amusement, not only from their architectural arrangements, but in gathering, placing, and rearranging their treasures, and in keeping the premises in the neatest and prettiest condition possible. It is difficult to understand how any other purpose is served by these structures than simply that of providing a convenient place for the lively movements by which they display themselves to the females, as has been alluded to above, and for the duels which frequently take place between rival males, sometimes with fatal results; but to this must be added the gratification of an inherited instinct of acquisitiveness, and a real delight in beautiful things. The species of another genus (*Prionadura*) make similar "bowers" four to six feet high.

Detailed descriptions of these and several other similar birds and their works will be found in the books relating to the ornithology of Australia and New Guinea, and especially in the writings of the Italian naturalists, Beccari and Salvadori. An excellent résumé may be read in Lydekker's 'Royal Natural History,' Vol. III. (Lond. 1885). Several species have been brought alive to Europe and may usually be seen, with their curious bowers, in the zoological gardens of London, Paris, and elsewhere; while the museums in New York and Washington contain models of some of their ornamental structures.

Bowers, Elizabeth Crocker, American actress: b. Ridgefield, Conn., 12 March 1830; d. Washington, D. C., 6 Nov. 1895. She made her first appearance on the stage at the Park Theatre, New York, in 1846, and in 1847 married David P. Bowers and appeared in Philadelphia as Donna Victoria in 'A Bold Stroke for a Husband.' She was a stock member of the Arch Street company in Philadelphia until her husband's death in 1857. She remarried in 1860, and in the next year made a professional trip to England with great success. She

BOWERS—BOWLING GREEN

returned to New York in 1863, and, after fulfilling several engagements, retired from the stage. In 1884 she returned to the stage in 'La Charbonniere,' and in 1886 began a series of performances with her own company at the 14th Street Theatre in New York. She played with Rose Coghlan in 'A Woman of No Importance,' in 1893, and supported Olga Nethersole in her first appearance in the United States in 1894. Her last impersonation was that of Lady Margrave in 'The New Woman' in the early part of 1895.

Bowers, Theodore S., American soldier: b. Pennsylvania, 10 Oct. 1832; d. Garrison's Station, N. Y., 6 March 1866. At the outbreak of the Civil War he was editor of a Democratic paper in Mount Carmel, Ill. After the battle of Bull Run he raised a company for the 48th Illinois Infantry, but declined its captaincy on account of the taunts of former political associates, and went to the front as a private. On 25 Jan. 1862 he was detailed as a clerical assistant at Gen. Grant's headquarters. That officer found him invaluable and kept him near him until the close of the war. He went through the campaigns of Forts Henry and Donelson, and while the army was absent on the Talla-hatchie expedition Bowers was left in charge of the department headquarters, having received a regular staff appointment as captain and aide-de-camp. When Van Dorn seized the headquarters at Holly Springs 20 Dec. 1862, Bowers destroyed all the departmental records that would have been of value to the Confederates, refused to give his parole, and made his escape during the night. He was twice brevetted for gallant and meritorious services, and after the war Gen. Grant retained him on his personal staff, having procured his appointment as assistant adjutant-general with rank of major in the United States army, 6 Jan. 1865. He was killed while boarding a moving train.

Bowery, The, a street in New York. It begins at Chatham Square and terminates at Cooper Union. It was long notorious for the resorts located along its length, but its character has undergone improvement.

Bowfin, a fish (*Amia calva*) of the Mississippi Valley. See MUDFISH.

Bowhead, the Greenland or right whale, taking its name from the arched outline of its head. See GREENLAND WHALE.

Bowie, bō'e, James, American frontiersman: b. Burke County, Ga., about 1790; d. 6 March 1836. He took part in the revolt of Texas against Mexico, and fell in the Alamo massacre. He gave his name to the bowie-knife (q.v.).

Bowie-knife, a long knife shaped like a dagger, but with only one edge, named after Col. James Bowie (q.v.). Its use as a weapon was originally confined to Texas, but is now used in almost all the States of the Union. Col. Bowie is said to have had his sword broken down to within about 20 inches of the hilt in a fight with some Mexicans, but he found that he did such good execution with his broken blade that he equipped all his followers with a similar weapon.

Bowker, Richard Roger, American author: b. Salem, Mass., 1848. He has been prominent in politics as an independent and was the ori-

ginator of the independent Republican movement of 1879. He has edited the 'Publisher's Weekly,' the 'Library Journal,' and the 'American Catalogue,' and has published 'Work and Wealth'; 'Economics for the People'; 'Copyright: Its Law and Its Literature'; 'Primer for Political Education'; 'Electoral Reform'; 'The Arts of Life'; 'Civil Service Examination.'

Bowles, Francis Tiffany, American naval constructor: b. Springfield, Mass., 7 Oct. 1858. He was graduated at the United States Naval Academy in 1879, and has ever since been prominent in the work of naval construction, with special reference to the rehabilitated United States navy. He has been in charge of construction at the navy yards in Norfolk and Brooklyn, and was made chief constructor of the navy with the rank of rear admiral in 1901.

Bowles, Samuel, American journalist: b. Springfield, Mass., 9 Feb. 1826; d. 16 Jan. 1878. He was editor and proprietor of the *Springfield Republican* and a prominent factor in public affairs. He wrote 'Across the Continent' and 'The Switzerland of America.'

Bowles, William A., Indian agent and chief: b. Frederick County, Md.; d. 23 Dec. 1805. When 13 years of age he ran away from home and joined the British army at Philadelphia. He afterward went among the Creek Indians, married an Indian woman, and was one of the English emissaries to excite them against the Americans. After the war he went to England, and on his return his influence among the Indians was so hostile to the Spaniards that they offered a price of \$6,000 for his capture. He was taken in July 1792, sent to Madrid, and afterward to Manila. Having obtained leave to visit Europe, he returned among the Creeks and instigated them to renewed hostilities. He was betrayed again into the hands of the Spaniards in 1804, and died in Morro Castle, Havana. His biography was published in London in 1791.

Bowles, William Lisle, English poet: b. King's Sutton, Northamptonshire, where his father was vicar, 1762; d. Salisbury, 7 April 1850. He was educated at Winchester and Oxford, where he gained high honors. In 1789 he composed a series of sonnets by which the young minds of Coleridge and Wordsworth, then seeking for new and more natural chords of poetry, were powerfully affected to such an extent that Bowles is considered to have created, by his influence, the Lake School of Poetry. In 1806 he issued a critical edition of Pope, which led to a memorable controversy (1809-25), in which Byron and Campbell were his opponents. His other works include: 'The Grave of Howard' (1790); 'Coombe Ellen' (1798); 'The Battle of the Nile' (1799); 'The Spirit of Discovery' (1804), his longest poem; and 'St. John in Patmos' (1832).

Bowling (bō'ling) Green, Ky., a city and county-seat of Warren County, 114 miles southwest of Louisville, of prominence as an educational centre. Here are situated Ogden College, founded in 1877; Potter College for women, opened in 1889; the Southern Normal School; Saint Columbia's Academy; and a business college. The city is surrounded by a fertile agricultural region, has an important trade in hogs and mules, and one of the largest horse markets

BOWLING GREEN — BOWMAN

in the State. It contains two parks, one of 42 acres, and owns and operates its waterworks and electric-lighting establishment. It was incorporated in 1812 and is governed by a mayor elected every four years, and a city council. At the time of the Civil War Bowling Green was of much strategic importance to the Confederate army. Pop. (1910) 9,173.

Bowling Green, Mo., a city and county-seat of Pike County, 90 miles northwest of St. Louis; situated on the Chicago & A. and St. Louis & H. R.R.'s. It was settled in 1820, and incorporated in 1838. Pike College is here located and among the industries of the place are flour and pipe manufacturing. Pop. (1910) 1,585.

Bowling Green, New York City Park, a small open space near the foot of Broadway, originally a village green and an aristocratic centre of the city. Fort Amsterdam, which had formerly stood at the south of the green, was removed in 1787 and the governor's residence took its place. The present Green is a very small enclosed park.

Bowling Green, Ohio, a city and county-seat of Wood County; situated on the Cincinnati, H. & D., and the Toledo & O. C. R.R.'s, 22 miles south of Toledo. It carries on a trade in farm produce and is the centre of a region producing oil and natural gas. Among the other industries are iron smelting, canning and glass-cutting. Private companies operate waterworks, gas works, an electric-lighting system, and a hot water heating plant. The city was settled in 1832 and incorporated as a borough 1855 and city in 1900. It is governed by a mayor biennially elected and a board of public service of five members. Pop. (1910) 5,222.

Bowls, Bowling, an American indoor game; also much played in Great Britain, and probably a modification of the English game of skittles (q.v.). It is played in a covered alley of carpenter's work from 65 to 70 feet in length and about 3 feet 6 inches wide. The alley has a gutter on each side, and is slightly convex in the centre, and regularly beveled toward the gutters. At the farther extremity ten pins, generally of ashwood, about 12 inches high, and shaped somewhat like a champagne bottle with a slightly tapering base, are set up in the form of a triangle having its apex toward the bowler; that is, with four pins on the rear or fourth line, three on the third, two on the second, and one on the first line, all being 12 inches apart. The pins are uniform in weight. The balls may never exceed 27 inches in circumference; but smaller sizes are optional. The bowler is entitled to two (formerly three) balls, which he rolls at the pins, the object being to knock down as many pins as possible, the number displaced being registered to the bowler's credit. The first record of a match seems to have been made on 1 Jan. 1840, at the Knickerbocker Alleys, New York; but it was not until 1875 that the bowlers of the principal cities held a convention for the purpose of framing rules for the game, and it was 20 years later when the American Bowling Congress brought the sport into anything like systematic order. The rules of the game in all its varieties are published by the Congress.

Another form of bowls, an ancient English game, is still extremely popular in its own coun-

try. It is played on a smooth, level piece of green sward, generally about 40 yards long, and surrounded by a trench or ditch about 6 inches in depth. A small white ball, usually of earthenware, called the jack, is placed at one end of the green, and the object of the players, who range themselves in sides at the other, is so to roll their bowls that they may lie as near as possible to the jack. Each bowl is much larger than the jack, is made of lignum-vitæ or similar wood, and is biased by being made slightly conical, so as to take a curvilinear course; and in making the proper allowance for this bias, and so regulating the cast of the ball, consist the skill and attraction of the game. The side which owns the greatest number of bowls next the jack — each bowl so placed constituting a point — carries off the victory. The game played in Scotland differs in several respects from that of England; and the latter country, unlike the former, has as yet no national bowling association.

Bowman, bō'măn, Alexander Hamilton, American soldier: b. Wilkesbarre, Pa., 15 May 1803; d. there, 11 Nov. 1865. He graduated from the United States Military Academy 1825, and entered the engineer corps. For a time he was assistant professor of geography, history, and ethics at the academy. He acted as assistant engineer in the construction of the defenses, and of the improvement of harbors and rivers on the Gulf of Mexico, 1826-34, and was superintending engineer of the construction of Fort Sumter, 1838-51. Later he was chief engineer of the construction bureau of the United States treasury, and employed in building custom-houses, post-offices, marine hospitals, etc. During the Civil War he was superintendent of the United States Military Academy, and from 20 June 1865 till his death a member of the board of engineers to carry out in detail the modifications of the defenses in the vicinity of Boston, Mass. He attained his lieutenant-colonelcy in the engineer corps, 3 March 1863.

Bowman, Edward Morris, American organist: b. Barnard, Vt., 1848. His musical education was thorough and varied. He studied in New York under Dr. William Mason, in London under Dr. Bridge, in Berlin under Weitzmann and Bendel, and in Paris under Guilmant. He has been conspicuously successful as an organist, choral conductor, and teacher. In 1895 he took charge of the Temple Choir in connection with the Baptist Temple, Brooklyn, N. Y., and succeeded in making popular a high standard of music, both ecclesiastical and secular. In 1891 he succeeded Dr. F. Ritter as professor of music at Vassar College. He was a founder and for eight terms president of the American College of Musicians. His compositions comprise songs, part songs, anthems, and orchestral numbers, and he has published: 'Bowman-Weitzmann Manual of Musical Theory' (1877); 'Harmony: Historic Points and Modern Methods'; 'Formation of Piano Touch'; 'Relation of Musicians to the Public.'

Bowman, Thomas, American Methodist bishop: b. Berwick, Pa., 15 July 1817. He graduated at Dickinson College 1837, and entered the ministry in the Baltimore conference of the Methodist Episcopal Church. In 1848 he organized the Dickinson Seminary at Williams-

port, Pa., and was its president for 10 years. In 1858 he was elected president of Indiana Asbury University (now DePauw University), remaining there until May 1872, when he became a bishop. He has visited all the conferences in the United States, Europe, India, China, Japan, and Mexico, and is distinguished for his fine pulpit eloquence.

Bowman, Sir William, English anatomist and surgeon: b. Nantwich, 20 July 1816; d. London, 29 March 1892. He was for some time surgeon to King's College Hospital, London, and professor of physiology and anatomy in King's College, and was especially distinguished as an ophthalmic surgeon. He gained the Royal Society's royal medal for physiology in 1842. In 1880 Cambridge, and in the following year Edinburgh, conferred on him the degree of LL.D. He was connected with a large number of scientific societies, both British and foreign, was collaborator with Todd in the great work on the 'Physiological Anatomy and Physiology of Man' (5 vols. 1845-56), and he also wrote 'Lectures on the Eye' (1849); 'Collected Papers' (1892). His baronetcy was conferred on him in 1884.

Bowman's Root, *Gillenia stipulacea*, a hardy perennial herb of the natural order *Rosaceæ*, two to four feet tall, found in rich woods from New York to Georgia, and often planted in shrubberies for their graceful foliage and numerous terminal clusters of white or rose-tinted flowers. The name is also applied to its close relative, *G. trifoliata*, which grows farther south and bears a rather close resemblance to it. Both species are also called Indian physic, American ipecac, Indian hippo, and have been used as tonics and emetics. They are the only species of their genus.

Bowne, bown, Borden Parker, American philosophical writer: b. Leonardville, N. J., 14 Jan. 1847. He was religious editor of the New York 'Independent' 1875-6, becoming professor of philosophy at Boston University in 1876. He has written 'Philosophy of Herbert Spencer' (1874); 'Metaphysics' (1882); 'Principles of Ethics' (1892); 'The Christian Life' (1878); 'The Atonement' (1900), etc.

Bowring, Sir John, English statesman and linguist: b. Exeter, 17 Oct. 1792; d. there, 23 Nov. 1872. While still very young he entered a business house in his native town, and in 1811 became clerk to a London firm, on whose business he traveled to Spain. Soon afterward he started on his own account, and made many journeys to the continent. Having extraordinary linguistic ability he made use of his residence in foreign countries to acquire the different languages, and his first publications consisted of translations, especially of the popular poetry of many of the countries he had visited. At the same time he appeared as a supporter of the Radical politics of the time and of the views of Jeremy Bentham, and acted as editor of the 'Westminster Review' from 1824 till 1830. His public life began in 1828, when he was sent to Holland to make a report on the public accounts of that kingdom. He afterward received similar commissions to France, Switzerland, Italy, Egypt, Syria, and Germany, and the Blue-books which appeared from his pen on these separate occasions are considered as models of their kind. He was member of

Parliament for the Kilmarnock burghs from 1835 to 1837, and for Bolton from 1841 to 1849. In the year last mentioned he accepted the lucrative post of consul at Canton, and his services during the four years that he held this post were so appreciated by the ministry that in 1854, the year after his return, he received the honor of knighthood, and was appointed governor of Hong-kong. As governor of Hong-kong he acted with the same energy that he had manifested when consul at Canton; but the step which he took in ordering Canton to be bombarded to punish the Chinese for an insult offered to the British flag, although approved by Lord Palmerston, then at the head of the government, led to his recall, March 1857. The last public commission he received was in 1860, when he was sent to Italy to report on the commercial relations with the new kingdom. He published 'The Kingdom and People of Siam'; and his 'Autobiographical Reminiscences' appeared in 1877. He will, perhaps, be longest remembered as the author of the familiar hymn, 'Watchman, Tell Us of the Night.'

Bowser, Edward Albert, American mathematician: b. Sackville, New Brunswick, 18 June 1845. He graduated at Rutgers College in 1868, and since 1871 has been professor of mathematics and engineering there. Since 1875 he has had charge of the United States Coast and Geodetic Survey of New Jersey. He has published 'Analytical Geometry' (1880; 10 ed. 1888); 'Differential and Integral Calculus' (1880; 9 ed. 1887); 'Analytical Mechanics' (1884); 'College Algebra' (1888); 'Academic Algebra' (1888); 'Plane and Solid Geometry' (1890); 'Elements of Trigonometry'; 'Treatise on Trigonometry' (1892); 'Logarithmic Tables' (1895); 'Hydromechanics'; 'Roofs and Bridges.'

Bowstring Hemp, the fibre of the leaves of an East Indian plant, or the plant itself, *Sansevieria seylanica*, order *Liliaceæ*, so named from being made by the natives into bowstrings. The plant is somewhat like a hyacinth in appearance, and has edible roots. The fibre is fine and silky, but very strong, and may become a valuable article in European manufacture. See **HEMP**.

Bowyer, bo'yér, Sir George, English law writer: b. Oxford, 1811; d. London, 7 June 1883. He was called to the bar in 1839. Converted to Catholicism in 1850, he represented Dundalk 1852-68, and the county of Wexford 1874-80, when his Home Rule principles estranged him from the Liberal party, and, in 1876 led to his expulsion from the Reform Club. He succeeded his father as seventh baronet in 1860. He was author of several able works on constitutional law and Catholic subjects.

Bowyer, William, English printer and classical scholar: b. London, 19 Dec. 1699; d. 18 Nov. 1777. He was admitted a sizar of St. John's College, Cambridge, but left the university without a degree in 1722, and became an associate in the printing trade with his father. In 1729 he obtained the office of printer of the votes of the House of Commons, which he held nearly 50 years. He was subsequently appointed printer to the Society for the Encouragement of Learning, the Society of Antiquarians, of which

BOX—BOXERS

learned body he was admitted a member; and in 1761 Lord Macclesfield procured him the appointment of printer to the Royal Society. In 1767 he was nominated printer of the journals of the House of Lords, and the rolls of the House of Commons. By his will he bequeathed a considerable sum of money, in trust, to the Stationers' Company, for the relief of decayed printers or compositors. His principal literary production was an edition of the New Testament in Greek (1763), with critical notes and emendations. He also published several philological tracts, and added notes and observations to some of the learned works which issued from his press.

Box (*boxus*), a genus of about 20 species of evergreen shrubs or small trees of the natural order *Euphorbiaceae*, natives of northern Africa, southern Europe, Central America, and similar climates in Asia. The species have small opposite leaves, inconspicuous monoecious flowers in terminal or axillary clusters and nearly globular fruits containing two shining black seeds. Several species are planted for ornament as edgings of borders, as hedges and as individual specimens, especially for topiary work, either in the open air or as glasshouse specimens in tubs, etc., for which uses some of them are particularly adapted since they stand shearing well. They are of slow growth and are not very hardy where the winters are at all severe. They are propagated by cuttings. *B. sempervirens*, which attains a height of 25 feet or more, has developed several cultivated varieties of which dwarf box, a favorite edging plant, is probably the best known. The very hard, heavy, light yellow wood exported largely from Spain and Portugal is highly valued for turning, carving, and engraving, and for making musical instruments such as flutes, clarionets, etc. The bright yellow wood of *B. balearica*, a larger species than the preceding, native to Turkey and certain islands of the Mediterranean, is largely exported from Constantinople for similar purposes to those of the first mentioned, but is inferior.

Box'berry. See GAULTHERIA.

Box-crab, a large thick-shelled crab (*Callinectes flamma*), occurring from North Carolina southward, and not uncommon on the Florida reefs. It is four to five inches across, about an inch and a half deep, with large broad, flat claws, which are folded closely in front. It is admirably adapted to resist the violence of the surf.

Box-elder, or **Ash-leaved Maple** (*Negundo aceroides*), a tree of the natural order *Sapindaceae*, common from the Atlantic coast to the Rocky Mountains. It attains a height of 70 feet, bears pendulous corymbs of staminate flowers and drooping racemes of pistillate blossoms before the pinnate leaves appear. Its wood is inferior for any purposes except for making wood pulp, bowls, pails, etc. It has become very popular in the western United States for windbreaks, fuel, and shade, for which its rapid growth and hardness especially adapt it. It is excellent also to protect other trees until they can care for themselves.

Box-turtle, or **Tortoise**, a turtle of the American family *Cimosternidae*, having a rather long and narrow shell, in which the under part

(plastron) has its front, and usually also its rear lobes hinged to the fixed central part, so that these ends may be lifted up against the carapace, like doors, thus entirely enclosing the animal within the shell. A familiar example is the mud-turtle (*Cimosternum pennsylvanicum*) of the eastern and southern United States, which is four inches long, has a dusky brown shell, and light dots on its head. Eight or 10 other species are known in the southwest, in Central America, and in Guiana. These turtles are mainly aquatic and carnivorous, and lay only a few eggs, which are covered with a glazed shell, thick, but brittle. Another noteworthy species, sometimes placed in a separate genus (*Aromochelys*) because its plastron is only partly movable, is the "musk" or "stink-pot" turtle (*C. odoratum*) of the eastern United States, which emits a musky odor from its inguinal glands. Its dull shell is about 4.50 inches long; it has a long neck, and relatively enormous head marked with two yellow stripes, one above, one below the eye; spends its time mainly in the water; and is disagreeable in odor and disposition. This turtle, however, is kept captive, fattened on swill-milk and eaten in some parts of the country.

Box and Cox, a farce by John M. Morton, the chief characters being the two men from whom the play takes its name. Box and Cox rent from a certain Mrs. Bouncer the same room, but for some time remain ignorant of the fact, as one works by day and the other by night. A holiday discloses the situation, which mutual agreement leaves unaltered.

Box'ers, the name given to the members of a powerful secret society in China. Its avowed object is the driving out from China of all Europeans or other foreigners. The Chinese name for the association is I-ho-ch'uan, which is variously rendered in English. The active efforts of American and European missionaries and the constant encroachments upon Chinese territory by European countries appear to be responsible in great measure for the establishment of the society. The events which precipitated the first demonstrations of the Boxers were the occupation of Kiao-Chau by Germany, the acquisition of Port Arthur by Russia, the taking of Wei-Hai-Wei by England, and the French seizure of Kwang-Chau. Thus the Boxer movement presents itself largely under the aspect of a patriotic uprising against foreign aggression, a fact which goes far to account for the rapidity and thoroughness of its operations in 1900. Early in that year the native population in Shantung were found to be rallying around the standard of the Boxers and adopting its motto, "Uphold the dynasty, drive out the foreigners." The diplomatic corps at Peking called upon the imperial government to suppress the movement. This the court professed its readiness to do, although there was a suspicion, voiced by the British minister, that the Empress Dowager had fallen under the influence of a native party led by T'ung Fuh-siang and Yu-hsien, and was temporizing with the Boxers. In May 1900 the Boxers began a concerted movement upon the Chinese capital, which, notwithstanding the protests of the diplomatic corps, remained unchecked by the military forces of the empire. These forces being Manchu troops, their loyalty was open to ques-

BOXING

tion and their sympathies were alleged to be with the Boxer movement. This, at any rate, is the only explanation offered by the Chinese government for its failure to cope with the uprising. The situation had been rendered additionally threatening by the action of the allies in opening fire upon the forts at Taku. On 17 June the warships of the powers were in force at that port; when fired upon by the Chinese they opened a bombardment. The demonstration before Taku had been deprecated by the United States commander, Admiral Kempff, who did not participate in the bombardment. His warning that hostilities would unite the Chinese against the foreigners was justified by events.

In June 1900, Peking was reduced to a state of siege by the Boxers. The position of the foreigners in the capital became precarious. The entire diplomatic corps was cut off from communication with the outside world. In the emergency the powers hurried military and naval forces to the scene, and an international relief column, under the command of Admiral Seymour of the British navy, moved upon Peking. This force was, however, compelled to retreat, when a short distance beyond Tien-Tsin, with a loss of 300 men. The position of the capital now became desperate. Cut off from communication with the rest of the world, Peking was a scene of turbulence and the centre of wild rumor. It was reported that on 7 July the entire diplomatic corps had fallen a prey to Boxer fury. This rumor was later discredited, the aspect of affairs having been rendered incomprehensible by the receipt of a despatch purporting to emanate from United States Minister Conger, and bearing date 18 July. According to this despatch the diplomatic corps had taken refuge in the British embassy, where they remained in a state of siege by the Boxers, anticipating massacre unless speedily relieved. Meanwhile the allies had concentrated their forces upon Tien-Tsin, capturing the place in the middle of July, but suffering severe loss. The 9th Regiment, United States army, had many casualties, including the loss of its colonel and other officers. The movement had spread in all directions among the Chinese, who, on 16 July, invaded Siberia. Russia at once proclaimed a state of siege in its Asiatic dominions. The powers did not, as yet, give formal recognition to a state of war, chiefly in consequence of the attitude of the United States, which took the ground that the Chinese government had been overpowered by an insurrectionary movement. On 20 July the powers made a categorical demand to be placed in communication with their diplomatic representatives. The authorities at Peking professed their readiness to comply at the earliest possible moment. The international situation was more clearly defined on 23 July by the appeal of China to the United States for the good offices of the latter in dealing with the powers. See CHINA.

Boxing, as now practised and popularly defined, is a contest of skill, endurance, and pluck between two contestants striking at each other with the closed hand, or fist, covered with a soft leather glove stuffed with horsehair. Contests of this nature, in various forms, are probably coeval with man. The sport was much in

vogue among the Greek and Roman athletes, but in place of the modern tendency to deprive it of its more brutal characteristics, as by the use of gloves, the ancients made the punishment as severe as possible by arming the fists of the combatants with strips of rawhide (the *cestus*), which were often knotted and loaded with lead or iron. In the first half of the 18th century rules were formulated to govern such contests in England, and from that time onward the practice of fighting with the fists for prizes or for championships has been reduced well-nigh to a "science." Methods of striking, ring tactics, etc., have developed until mere brute force has had to give way before intelligence; in other words, the head has defeated the hands.

In 1719 one Figg, an English pugilist, who attained such celebrity as to have his portrait painted by Hogarth, brought about some system in the conduct of the prize-ring. His work was continued by Broughton, himself for many years champion of England and a great upholder of the sport. Regular contests were held, with prizes of money and an emblem of championship, usually a belt, which was held on the condition of meeting all comers, on penalty of surrendering it if declining the trial or beaten by the adversary. The use of a belt as such emblem is of very ancient origin, dating back at least to the time of the siege of Troy. Homer, in describing the games at the funeral of Patroclus, mentions a belt in this connection. There is an unbroken record of championships from the time of Figg down. But since 1860, when the British champion, Tom Sayers, fought the American John C. Heenan, fighting with bare knuckles, which had hitherto been the custom, was suppressed, and in its place the use of gloves was adopted. The laws were, however, frequently evaded by the use of skin-tight gloves. At the present time gloves weighing four ounces are used for championship matches.

With the use of gloves came also the adoption of new rules, named, from their framer's title, the Marquis of Queensberry's rules. Under these wrestling and hugging (which had previously been permitted) were prohibited; the time of each round was limited to three minutes, with intervals of one minute between each round; and the former space of 30 seconds within which a man knocked off his feet might recover himself and be brought back to the fighting-line was reduced to 10 seconds.

Under the new conditions boxing has taken a leading rank as a sport and exercise. In the former aspect legislation has been found necessary to restrict its tendency to degenerate into brutality and to lend its aid to gambling and other vices. As an exercise, however, it holds a high place. It is considered the best system of gymnastics for bringing all the limbs under perfect command; rendering every part of the body pliant, flexible, and firm; acquiring a perfect power of keeping the true centre of gravity in every position, and of extending the body and limbs to the extreme length and recovering again without pause or difficulty; and developing the power of breathing and the "staying" qualities. The practice of boxing also gives to those proficient in it a remarkable power of calmly looking danger in the eye, and preserving both the temper and the courage under trying circumstances unruffled. It is

BOXING THE COMPASS—BOY SCOUTS

alleged by the defenders of this sport that it encourages individual and therefore national courage; that it leads to a general sense and sentiment of fair play and honor; and that it discourages and renders infamous the use of the knife and other deadly weapons.

Amateur boxers are divided into seven classes considered according to weight—105 pounds, 115, 125, 135, 145, and 158 pounds, all over the latter weight being classed as "heavy" weights. Among the lighter weights the classes are sometimes termed "bantam" weights, "feather," "light," and "middle" weights. The term "catch weights" implies no restriction as to weight.

The laws governing the practice of the sport vary in different States of the Union and in Great Britain, and cannot be accorded space here. The rules and history may be found in such works as the following: 'Boxiana, or Sketches of Ancient and Modern Pugilism,' by Pierce Egan (London, 4 vols. 1818-24); Mitchell's 'Boxing' (Badminton Library 1889); 'Cassell's Book of Sports and Pastimes' (New York 1890); Earl's 'Handbook of Boxing' (1893); B. J. Doran's 'Science of Self-Defense' (Toronto 1893); 'Boxing,' in the Oval Series (New York 1896); 'Encyclopædia of Sport' (New York 1902); 'Handbook on Boxing' (New York 1903).

Boxing the Compass. the recital of all the points of the compass in their proper order.

Boxing-day, in England, the day after Christmas, so called from the practice of giving Christmas-boxes or presents on that day. It was made a bank holiday by the act of 1871.

Boxthorn. See LYCEUM.

Boy Bishop, a boy chosen on St. Nicholas' Day, 6 December, by the votes of his fellow-choristers, to act the part of bishop, retaining office until St. Innocent's Day, 28 December. This custom of the mediæval Church, as practised in England, extended to the schools of Winchester and Eton. Dressed in the Episcopal vestments, with mitre, crozier, and ring, the youthful bishop went about attended by a dean and prebendaries and followed by children; went through the forms of blessing and of preaching, more to the entertainment than edification of his hearers. Boy bishops dying during their incumbency, were buried in their Episcopal attire. The custom of electing a boy bishop came to an end in England during the reign of Queen Elizabeth.

Boy Scouts. The Boy Scout movement is indicative of two striking tendencies in the thought and activity of the present day, the tendency toward altruism and the tendency to consider the children and youth of the race as worthy of the most intense care. The enthusiasm with which the project has been welcomed on the part of the lads themselves would seem to prove that the plan of the movement is correct and wise. There is much beside play in the vows and the endeavors of the Scout. The pledge which admits him to scouthood is as follows: "On my honor I promise to do my best. (1) To do my duty to God and country. (2) To help other people at all times. (3) To obey the scout law."

There are 9 points of the laws of the Scouts. Abbreviated, they are as follows: "(1) A scout's honor is to be trusted. If a scout were to break his honor by telling a lie, or by not carrying out an order exactly when trusted on his honor to do so, he may be directed to hand over his badge, and never to wear it again. (2) A scout is loyal to his country, his officers, his parents and his employers. (3) A scout's duty is to be useful and to help others. He must be prepared at any time to save life or to help injured persons. And he must try his best to do a good turn to somebody every day. (4) A scout must never be a snob. A snob is one who looks down on another because he is poorer or who is poor and resents another because he is rich. (5) A scout is courteous. That is, he is polite to all but especially to women and children and old people and invalids, cripples, etc. And he must not take any reward for being helpful and courteous. (6) A scout is a friend to animals. He should save them as far as possible from pain and should not kill any animal unnecessarily. Killing an animal for food is allowable." The seventh law relates to obedience, the eighth to cheerfulness and to clean and reverent speech (the punishment for swearing or other bad language is a mug of cold water poured down the sleeve of the offender by the other scouts), the ninth to thrift—but the incentive to thrift is, again, not only that he may have money to keep himself when out of work to prevent his becoming a burden upon others but "that he may have money to give away to others when they need it."

There are degrees in scouthood as there were in knighthood. The first degree is that of "Tenderfoot," to which the candidate is admitted if he has reached the age of twelve years, after passing successfully an examination on scout laws and signs, on the composition of his country's flag and the manner and methods of flying it, and on the tying of certain hunter's and sailor's knots. After serving a month as a tenderfoot scout he may become a second-class scout if he is able to qualify upon nine points, among which are: elementary first aid in bandaging; signaling, elementary knowledge of semaphore or Morse alphabet; ability to go a mile in 12 minutes at "scout's pace;" to lay and light a fire not using more than two matches; to cook a quarter of a pound of meat and two potatoes without other cooking utensils than the regulation "billy" a combination can and skillet; to know the 16 principal points of the compass.

The tests for promotion to the rank of first-class scout are still more arduous. Once admitted to this rank the scout has a long line of advancement opened to him, his progress in which is acknowledged by the award of coveted medals. Highest of these is the bronze cross bestowed upon a scout who has saved a life at the risk of his own.

Scouts are organized in patrols and troops. Eight boys constitute a patrol, one of whom is known as the Patrol Leader. Three patrols make up a troop. The Scout Master is the adult leader of the troop. Three hundred and ninety-five Local Councils have been organized in various cities through the United States representing a total of 22,000 men on their various committees.

BOYACA—BOYCE

The organization of the Boy Scouts was effected at Birkenhead, England, by General Baden-Powell on 24 Jan. 1908. In April 1910, a bill was introduced in the House of Representatives, at Washington, to incorporate in that city the Boy Scouts of America. Mr. W. D. Boyce, of Chicago, brought about the introduction of this bill, which was passed. The charter for the American organization was issued in June. Two already existing groups of boys formed a nucleus for the new movement. Mr. Ernest Thompson Seton had founded about 10 years before the Woodcraft Indians, and Mr. Dan Beard at about the same time had formed the Pioneers, or Sons of Daniel Boone. These societies now became merged in the new movement, with Mr. Seton as chairman of the committee on organization and Chief Scout, and Mr. Beard a committee member.

Mr. Seton had visited General Baden-Powell in 1904 and urged him to cooperate in a wide movement for the development of pure and sturdy character in boys, and it is said to be the influence of Mr. Seton which induced the officer to undertake the public work. General Baden-Powell had been especially interested in the possibilities of military training for boys since the famous siege of Mafeking in which he found their services of great value. The force of men with which he was holding the city was so small that he called for boy volunteers to act as messengers and orderlies. They displayed such courage and energy that the General referred to them particularly in his official report. Four hundred thousand boys in Great Britain now look up to him as their leader, live by the Scout's hand book which he compiled, and dub him affectionately "B-P." Mr. Seton is known to his American scouts as "Black Wolf" and already troops are organized in many of the States and cities and towns of the country.

Another organization of Scouts has been formed under the name American Boy Scouts. A distinctive feature of the American Boy Scouts is that their work is in close connection with the high schools, through the agency of the Public School's Athletic League. It is not, however, limited to the school groups. Wm. R. Hearst, of New York, is the founder of this organization.

Boyaca, *bō-yā-kā'*, United States of Colombia, the most populous department of the republic, lying on the Venezuelan border, southeast of Santander. Mountainous in the west, and consisting of great plains in the east, it produces emeralds, copper, iron, salt, and various cereals. Horses and cattle are raised on the plains. Area, 33,351 square miles; pop. about 720,000. The capital is Tunja.

Boyaca', a town of Colombia, South America, about 60 miles northeast of Bogota. It is inhabited mostly by Indians, contains extensive lime-kilns, and was the scene of a battle, 7 Aug. 1819, between the Spaniards and Gen. Bolivar, which resulted in the defeat of the former, and the establishment of Colombian independence. A college was established here in 1821. Pop. 7,000.

Bo'yar, or **Boiar**, among the Slavic nations, a free landowner independent of any sov-

ereign. It is synonymous with *cech*, *lech*, or *bajaris*, used by several Slavic tribes, such as the Bohemians and Poles. The word boyar was at first especially used by the Bulgarians, Serbs, and Russians, and then was adopted by the Moldavians and Wallachians. It represented the highest social condition, corresponding in certain respects to that of an English peer. In ancient Russia, the boyars were the next after the princes of the blood, or *knasia*, who were all originally petty sovereigns. The boyars formed a kind of supreme political body in the state, and acted as the council (*duma*) of the grand dukes. All the higher offices, civil and military, including the lieutenantcies in the provinces, were held by them. While Russia was still divided into several petty sovereignties, the boyars enjoyed the right of choosing for themselves and for their dependents the prince whom they wished to serve, and to leave the service at their pleasure, without any previous notification. When the Grand Dukes of Vladimir and of Moscow stripped these petty princes of their sovereign rights, and transformed them from vassals into subjects, the dignity of boyars was granted to their families. The boyars had their own military retinue and their clients; and their influence on the masses of the people often equalled that of the grand dukes. The sovereign *ukases* always contained the sacramental words, "ordered by the Grand Duke (subsequently it was 'by the Czar'), and approved by the boyars." Precedence among the boyars was reckoned according to the date of the title, which was hereditary, and the observance of it was carried so far that in the 16th and 17th centuries any boyar of an older creation refused to serve under a younger one. This struggle for rank was ended by the Czar, Alexis Michailowitch Romanoff, who destroyed the official records and diplomas of the boyars, but they retained their place among the nobility. Peter the Great wholly abolished their power and official privileges, and the name now remains only as a historical distinction, and a recollection of the past, in families which once possessed the dignity. In Rumania boyars still exist.

Boyce, Henry Harrison, American soldier: b. Ohio 1830; d. New York 1904. He served with distinction in the Civil War, being promoted to captain and then to general. He organized in 1894 the Navy League of the United States and became its secretary. For some years he lived in California where he edited the *Los Angeles Tribune*, and was chairman of the Republican State Committee.

Boyce, William, English musical composer: b. London, 1710; d. there, 7 Feb. 1779. He was a pupil of Dr. Maurice Greene, organist of St. Paul's. In 1736 he was chosen organist of the church of St. Michael, Cornhill; and was also appointed composer, and afterward (1758) organist to the Chapel Royal. On his setting to music an ode performed at the installation of his patron, the Duke of Newcastle, he was honored with the degree of Doctor of Music; and in 1755 he became master of the king's band. His greatest work is the scholarly 'Cathedral Music' (3 vols. 1760-78), but he

will be most generally remembered as the composer of 'Hearts of Oak,' which first occurred in Garrick's pantomime of 'Harlequin's Invasion' (1759). Of his musical compositions a serenata entitled 'Solomon' (1743), is the best.

Boycott. What is popularly known as the boycott is a form of coercion by which a combination of many persons seek to work their will upon a single person, or upon a few persons, by compelling others to abstain from social or beneficial business intercourse with such person or persons. Carried to the extent sometimes practised in aid of a strike it is a cruel weapon of aggression, and its use immoral and anti-social, and the concerted attempt to accomplish it is a conspiracy at common law, and merits and should receive the punishment due to such a crime. It is attempted to defend the boycott by calling the contest between employers and employees a war between capital and labor, and pursuing the analogies of the word to justify thereby the cruelty and illegality of conduct on the part of those conducting a strike. The analogy is not apt, and the argument founded upon it is fallacious. There is only one war-making power recognized by our institutions, and that is the government of the United States and of the States in subordination thereto when repelling invasion or suppressing domestic violence. War between citizens is not to be tolerated, and cannot in the proper sense exist. If attempted it is unlawful, and is to be put down by the sovereign power of the State and nation.

The practices common in a boycott would be outside the pale of civilized war. In civilized warfare women and children and the defenseless are safe from attack, and a code of honor controls the parties to such warfare which cries out against the boycott. Cruel and cowardly are terms not too severe by which to characterize it.

The name was first given to an organized system of social and commercial exclusion employed in Ireland in connection with the Land League and the land agitation of 1880, and subsequently. It took its name from Capt. James Boycott, a Mayo landlord; one of its earliest victims, who as agent for Lord Erne evicted many tenants. A landlord, manufacturer, or other person subjected to boycotting, faces a combination to prevent his buying from or selling to anyone employing labor, etc.; and those refusing to join in a boycott are often threatened with similar interference, loss or injury. Boycotts have been frequently employed in the United States as a means of coercion in labor difficulties. The attitude of courts is not altogether uniform in regard to such combinations. A boycott accompanied by violence is a criminal offense, and such conspiracy is sometimes declared unlawful even when not marked by threats and violence.

Boyd, Andrew Kennedy Hutchison, Scotch clergyman and author: b. Auchinleck, Ayrshire, 3 Nov. 1825; d. London, 2 Nov. 1899. He was educated at King's College, London, and Glasgow University; was ordained in 1851, and was incumbent successively of the parishes of Newton-on-Ayr, Kirkpatrick-Irongray, in Galloway, St. Bernard's, Edinburgh, and at the university city of St. Andrews. He early be-

came known as a contributor to 'Fraser's Magazine,' under the signature 'A. K. H. B.' Many of these contributions were reprinted in book form under the title, 'Recreations of a Country Parson,' of which three series appeared. In 1890 he was moderator of the General Assembly of the Church of Scotland. He also published 'Graver Thoughts of a Country Parson,' 'Counsel and Comfort Spoken from a City Pulpit,' 'Present-Day Thoughts,' 'Memorials of St. Andrew's Sundays,' 'Toward the Sunset,' 'What Set Him Right,' 'The Best Last,' 'Twenty-Five Years of St. Andrew's,' 'St. Andrew's and Elsewhere,' etc.

Boyd, Belle, Confederate spy: b. Martinsburg, W. Va., 9 May 1846; d. Kilbourn, Wis., 11 June 1900. She rendered invaluable aid to the Southern cause by detecting the Federal plans of campaign and revealing them to the Confederates. Gen. "Stonewall" Jackson sent her a letter of thanks.

Boyd, Ellen Wright, American educator: b. Winsted, Conn., 8 Sept. 1833. She has been principal of Saint Agnes' School, at Albany, N. Y., and has published 'Outlines of Religious Instruction,' 'English Cathedrals,' 'Famous Art Galleries.'

Boyd, James P., American lawyer and author: b. Lancaster County, Pa., 20 Dec. 1836. He was admitted to the bar in 1863 and successively edited several Philadelphia newspapers. His published works comprise: 'Lalecca' (1872); 'Envious Merchant' (1874); 'Building and Ruling the Republic' (1884); 'History of the Crusades' (1890); 'Bible Dictionary' (1896); 'Paris Exposition' (1900); and 'Lives of Grant, Sherman, Sheridan, Blaine, Harrison, McKinley, Emperor William I.; 'Men and Issues' (1892-1900).

Boyd, John Parker, American soldier: b. Newburyport, Mass., 21 Dec. 1764; d. Boston, 4 Oct. 1830. His father was from Scotland, and his mother a descendant of Tristram Coffin, the first of that family who emigrated to America. He entered the army in 1786 as ensign in the 2d regiment, but peace service did not suit his adventurous spirit and in 1789 he went to India. Under Nizam Ali Khan he was given an important command in Madras and at one time had an army of 10,000 men at his disposal. He remained in India several years, in a sort of guerrilla service, and obtaining much favor. Returning home in 1808 he was appointed colonel of the 4th regiment, United States Army. He took part in the battle of Tippecanoe, November 1811; was made brigadier-general 26 August and held that rank throughout the War of 1812. He was at the capture of Fort George, and in the battle of Chrysler's Field, Canada. In 1816 he went to England to secure indemnity for the loss of a valuable cargo of saltpetre captured by an English cruiser, but procured only a single installment of \$30,000. President Jackson appointed him naval officer at Boston in 1830, but his services were almost immediately cut short by his death.

Boyd, Mark Alexander, Scotch writer: b. 1563; d. 1601. He was educated at Glasgow under the superintendence of his uncle, the archbishop of that see, and was equally conspicuous for the alertness of his mind and the turbulence of his disposition. In Paris he reduced himself

to distress by gaming, and then, resuming his studies with ardor, went to Bourges to attend the celebrated civilian Cujacius. To this professor he recommended himself by a compliance with his taste in Latin poetry, which gave a preference to Ennius and the elder Latin poets. After leading a wandering life on the Continent for 14 years he returned to Scotland, and died at his father's seat in Ayrshire. He has received much the same eulogium in regard to graces of person, powers of mind, and various accomplishments as the Admirable Crichton. He is popularly known by his 'Epistolæ Heroïdum,' and his 'Hymni,' published in the 'Deliciæ Poetarum Scotorum.'

Boyd, Mary Stuart, Scottish writer. She was married to Alexander S. Boyd, a well-known illustrator, in 1880, and since 1890 has resided in London. Beside numerous contributions to reviews and other periodicals she has published 'Our Stolen Summer' (1900); 'A Versailles Christmastide' (1901); 'With Clipped Wings' (1902).

Boyd, Thomas Duckett, American educator: b. Wytheville, Va., 20 Jan. 1854. He graduated at Louisiana State University, and has held important posts in the educational institutions of Louisiana. Since 1896 he has been president of Louisiana State University.

Boyd, Zachary, Scottish divine: b. Ayrshire, about 1586; d. about 1653. He received the rudiments of his education at Kilmarnock School, and took the academical course in the College of Glasgow. About 1607 he went abroad and studied at the College of Saumur, France. He was appointed a regent in this university in 1611, and is said to have been offered the principalship, which he declined. He spent 16 years in France, during four of which he was a preacher of the gospel. In consequence of the persecution of the Protestants he was obliged to return home in 1621. There he lived successively under the protection of Sir William Scott of Elie and of the Marquis of Hamilton at Kinneil, it being then the fashion for pious persons of quality in Scotland to retain one clergyman at least as a member of their household. In 1623 he was appointed minister of the large district in the suburbs of Glasgow styled the Barony parish, for which the crypts beneath the cathedral church then served as a place of worship. In this charge he continued for the rest of his life. He filled the office of rector of the University of Glasgow 1634-5 and 1645. In 1629 he published his principal prose work, 'The Last Battell of the Soule in Death; whereby are shown the Diverse Skirmishes that are between the Soule of Man on his Deathbed and the Enemies of our Salvation, carefully digested for the Comfort of the Sicke.' This was reprinted at Glasgow in 1831, with a life of the author by Mr. Neil. He published various other works, chiefly devotional, and left a large quantity of manuscript writings, which are preserved in the Glasgow College library. Among the latter is one entitled 'Zion's Flowers,' consisting of poems on select subjects of Scripture history. It is popularly called 'Zachary Boyd's Bible,' and although it abounds in homely and ludicrous passages, it is not without a fine strain of devotional feeling. Boyd left a large legacy to the Glasgow College.

Boydell, John, English engraver, more distinguished as an encourager of the fine arts than on account of his own productions: a. Darrington, Shropshire, 19 Jan. 1719; d. 22 Dec. 1804. He was intended for his father's occupation, which was that of a land-surveyor. Accident having thrown in his way Baddeley's 'Views of Different Country Seats,' he conceived so strong an inclination for engraving that he determined to adopt it as a profession; and accordingly, when above 20, he bound himself apprentice for seven years to Toms, a London engraver. In 1745 he published six small landscapes, and afterward executed as many more views of places in and near London as formed a volume, which he published by subscription. With the profits of this work he established himself as a printseller, and by his liberality to artists in general established a high reputation as a patron of ingenious men. Woollet was employed by him to engrave the celebrated pictures of Niobe and Phaeton, and he furnished other eminent artists with occupation, and was thus enabled to carry on an extensive foreign trade in English prints, which tended greatly to his own emolument and to the credit and advantage of his native country. Having at length established what may be termed an English school of engraving, he next turned his attention to the improvement of the art of painting. With that view he engaged the first artists in the kingdom to furnish the collection of pictures forming the well-known Shakespeare Gallery. The wars arising out of the French revolution having obstructed his continental trade, he was induced in 1804 to solicit an act of Parliament to permit him to dispose of his gallery and paintings by lottery. This he obtained, and lived long enough to see every ticket disposed of, but died before the lottery was drawn.

Boydén, Seth, American inventor: b. Foxboro, Mass., 17 Nov. 1785; d. Middleville, N. J., 31 March 1870. He was brought up on a farm, and attended a district school. Mechanically inclined, he spent much time experimenting in a blacksmith shop. His first invention was a machine for making nails, and in 1809 he undertook to manufacture both nails and files. Soon afterward he invented a machine for splitting leather, and in 1815, he took it to Newark, N. J., where he engaged in the leather business. In 1816 he invented a machine for cutting brads, and followed this by the invention of patent leather, which he manufactured till 1831, when he began making malleable iron castings, on a system of his own. In 1835 he turned his attention to steam engines; substituted the straight axle for the crank in locomotives; and invented the cut-off now used instead of the throttle valve. In 1849 he went to California, but was unsuccessful, and returned to New Jersey, where he applied himself to farming, and developed a variety of strawberry previously unequaled in size or quality. In 1890, a statue was erected to his memory in Washington Park, Newark, N. J., where he spent the greater part of his life.

Boye, Martin Hans, Danish-American chemist and genealogist: b. Copenhagen, Denmark, 6 Dec. 1812; d. 1909. He was a graduate from the University of Copenhagen and from the medical department of the University of

BOYER—BOYLE

Pennsylvania in 1844. He came to the United States in 1836 and jointly discovered several chemical compounds, as well as perchloric ether in 1841. In 1845 he discovered the first process of refining cotton-seed oil. He was professor of chemistry at the Central High School in Philadelphia, 1845-59, retiring in the year last named. He published 'Pneumatics, or the Physics of Gases' (1856); 'Chemistry, or the Physics of Atoms' (1857).

Boyer, bwā-yā, Alexis, French surgeon: b. Uzerches, Limousin, 1 March 1757; d. Paris, 25 Nov. 1833. Although in his younger years he had to struggle against poverty and disease, he attended the lectures of Louis and Desault, and after a brilliant career as a student obtained the degree of Master of Surgery in 1787. He became successively surgeon to the Hospital de la Charité and to the Hôtel-Dieu, and was appointed first surgeon to Napoleon, receiving at the same time the title of baron of the empire, with a dotation of 25,000 francs. He became a member of the Institute in 1825, and was consulting surgeon to Louis XVIII., Charles X., and Louis Philippe. His chief works are: 'Traité d'Anatomie' (1797-9); 'Traité des Maladies Chirurgicales et des Opérations qui leur Conviennent' (11 vols. 1814-26). He also contributed to the 'Journal de Médecine' and the 'Dictionnaire des Sciences Médicales.'

Boyer, Jean Pierre, zhón pē-ār, president of the Republic of Hayti: b. Port-au-Prince, 28 Feb. 1776; d. Paris, 9 July 1850. He was a mulatto by birth, but came early to Europe, where he obtained a European education. In 1792 he entered the army, and fought with distinction against the English in San Domingo, but was nevertheless obliged to evacuate the island, to which he did not return till 1802. At first he acted as leader of the mulattoes in the war against the negroes, but afterward effected a union between these in order to prepare the way for the complete independence of the island. When Pétion established a free state in the western part of the island, Boyer undertook the command of the troops which were concentrated in Port-au-Prince. After the death of Pétion, Boyer was elected president in 1818. By his skilful military operations, not less than by his adroit diplomacy, he finally succeeded in uniting the eastern part of the island with the republic, and thus effecting the complete separation of the island from France and Spain in 1825. He also purified the internal administration, raised the financial condition of the republic, and bestowed particular care upon its educational institutions. The contest between mulattoes and negroes, however, still went on, and in the end the latter rose in rebellion against him, and compelled him to leave the island in 1843. He never returned to the place of his birth and of his long-continued activity, but lived for the rest of his life first in Jamaica, and afterward in Paris.

Boyesen, boi'e-sën, Hjalmar Hjorth, American novelist: b. Frederiksvärn, Norway, 23 Sept. 1848; d. New York, 4 Oct. 1895. After completing his university studies at Christiania, he came to the United States in 1869 and was editor of a Norwegian journal in Chicago. He returned to Europe in 1872 and studied German philology at Leipsic two years; then,

returning to this country, he was professor of German in Cornell University for six years, and then of Germanic languages and literature in Columbia College till his death. His story of Norwegian life, 'Gunnar,' published in the 'Atlantic Monthly' (1873), and his 'Idyls of Norway and Other Poems' (1883), give proof of his rare imaginative faculty and his deep human sympathies. Besides these, he wrote: 'Tales from Two Hemispheres' (1875); 'A Norseman's Pilgrimage' (1876); 'Falconberg' (1878); 'Goethe and Schiller: Their Lives and Works' (1878); 'Ilka on the Hill-Top' (1881, dramatized 1884); 'Queen Titania' (1882); 'A Daughter of the Philistines' (1883); 'Story of Norway' (1886). Some of his works have been translated into German, etc. He was a founder of the New York Authors' Club.

Boyle, Charles (FOURTH EARL OF ORRERY), English physicist: b. Chelsea, 1676; d. 28 Aug. 1731. While a student at Christ Church, Oxford, he published a new edition of the epistles of Phalaris, of which Dr. Bentley questioning the authenticity, he wrote an answer entitled 'Dr. Bentley's Dissertation on the Epistles of Phalaris Examined,' which produced the famous Boyle and Bentley controversy. On leaving the university in 1700 he was chosen member for Huntingdon; and on the death of his brother succeeded to the earldom, and was soon after elected a knight of the Thistle, and received the command of a regiment. He was subsequently raised to the dignity of a British peer, under the title of Lord Boyle. He retired from court soon after the accession of George I., and in 1722 was sent to the Tower on suspicion of being concerned in Layer's plot, but was discharged after six months' imprisonment. He constantly attended the House of Peers as before, but never spoke, though often employed in drawing up protests. Besides the edition of Phalaris, he published a comedy called 'As You Find It'; a copy of verses to Dr. Garth upon his Dispensary; and a Prologue to Southerne's play of the 'Siege of Capua.' His name of Orrery was given to an astronomical instrument invented by Mr. George Graham, whom he patronized.

Boyle, David, Canadian ethnologist: b. Greenock, Renfrewshire, Scotland, 1 May 1842. He went to Canada in 1856, and was first a blacksmith and then a teacher. He later took up geology and discovered the fossils *murchisonia boylei*, named in his honor. He has, for 15 years, been curator of the Archaeological Museum at Toronto. He has written 'Notes on Primitive Man in Ontario' and similar works.

Boyle, John (EARL OF CORK AND ORRERY), son of Charles Boyle: b. 1707; d. 1762. His earliest publication was a translation of two odes of Horace in 1742, which work was followed in 1751 by his 'Translation of the Epistles of Pliny the Younger, with Observations on Each Letter, and an Essay on Pliny's Life.' This translation advanced his reputation as a polite scholar, but has since been eclipsed by the superior version of Melmoth. In 1754 he made the tour of Italy, and employed himself in collecting materials for a history of Tuscany, which he intended to write in a series of

letters, 12 only of which have been published since his death. They are written in an agreeable manner, and contain some curious information respecting the Medici family.

Boyle, Richard (EARL OF CORK), English statesman: b. Canterbury, 13 Oct. 1566; d. 15 Sept. 1643. In 1588 he went to Dublin with strong recommendations to persons in power, whose patronage he obtained. The state of Ireland at that time having rendered land very cheap, he took advantage of the circumstance to make some considerable purchases, among which was the estate of Sir Walter Raleigh, consisting of 12,000 acres in the counties of Cork and Waterford, which he obtained on easy terms. He was then appointed clerk of the council under Sir George Carew, the president of Munster, whom he accompanied in various expeditions against the Irish insurgents, in opposition to the English government. On these and other occasions he distinguished himself by his talents and activity, and rapidly augmented his political power and influence. King James I. appointed him privy-councilor for Munster, and afterward for the kingdom of Ireland; in 1616 he was made a peer of that realm by the title of Baron Boyle of Youghall, and in 1620 was created Viscount Dungarvan and Earl of Cork. He was now in the height of his prosperity, living in his castle of Lismore in a style of grandeur more resembling that of a sovereign prince than of a private individual. In 1629 he was made one of the lords justices of Ireland, and in 1631 lord-treasurer of that kingdom. Like most of the English rulers of the sister island, he seems to have employed his power rather for the subjugation than the advantage of the native Irish. He built and fortified towns and castles, and introduced among the people arts and manufactures; but put in force the severe laws of Queen Elizabeth against the Roman Catholics, and transported multitudes of the ancient inhabitants from the fertile province of Leinster to the bogs and deserts of Kerry, supplying their place with English colonists. In 1641 the Earl went to England as a witness against Lord Strafford, then under impeachment, having quarreled with that nobleman during his viceroyalty. Soon after his return home the insurrection of the Irish broke out; on which event he displayed his accustomed activity, enlisting his tenantry under the command of his sons, and taking other measures for the defense of the country. Lord Cork is principally memorable as the founder of a family, several individuals of which have highly distinguished themselves as cultivators of literature, science, and the arts; yet it should not be forgotten that he attained a high degree of contemporary fame, and was designated in the age in which he lived — "The great Earl of Cork."

Boyle, Robert, English philosopher: b. Lismore Castle, Waterford, Ireland, 25 Jan. 1627; d. London, 30 Dec. 1691. He was the seventh son of Richard, the great Earl of Cork. In 1638 he went to Geneva, where he continued to pursue his studies for several years, returning to England in 1644. During this period his father had died, leaving him considerable property. He now went to his estate at Stalbridge, where he devoted himself to the study of physics and chemistry. He was one

of the first members of a learned society founded in 1645, which at first went under the name of the Philosophical College. On account of the political disturbances this society retired to Oxford, but was revived after the Restoration under the name of the Royal Society. Boyle occupied himself at Oxford in making improvements in the air-pump. Like Bacon, he esteemed observation the only road to truth. He attributed to matter merely mechanical properties. Every year of his life was marked by new experiments. We are indebted to him, indirectly, for the first certain knowledge of the absorption of air in calcination and combustion, and of the increase of weight which metals gain by oxidation. He studied the chemical phenomena of the atmosphere, and was thus a predecessor of Mayow, Hales, Cavendish, and Priestley. In all his philosophical inquiries he displayed an accurate and methodical mind, relying wholly upon experiments. While endeavoring to settle his faith, he found those defenses of the Christian religion which had been published before his time, unsatisfactory. In order, therefore, to read the original works, which are considered the foundation of Christianity, he studied the Oriental languages, and formed connections with Pococke, Thomas Hyde, Samuel Clarke, Thomas Barlow, etc. The result of his studies was a conviction of its truth, which was manifested not only by his theological writings, but by his benevolence and generous disinterestedness. He instituted public lectures for the defense of Christianity, devoting an annual sum to the payment of a lecturer. Boyle did much for the support of the mission in India, and caused Irish and Gaelic translations of the Bible to be made and printed at his own expense. To his religious principles were united the purest morals, a rare modesty, and an active benevolence. He was interred in Westminster Abbey. Birch published an edition of his works, five volumes, folio, London, 1744.

Boyle, Roger (EARL OF ORRERY), fifth son of the first Earl of Cork, English soldier: b. Waterford, 25 April 1621; d. 16 Oct. 1679. When only seven years old was created Baron Broghill, by which title he is usually known. He commanded a troop of cavalry raised by his father, was employed in the defense of the castle of Lismore, and displayed his courage and ability on many occasions in the service of Charles I.; on the cessation of whose authority he acted under the parliamentary commissioners in Ireland. When the king was put to death he retired for a while from public life; but being courted by Cromwell, he accepted a commission from him, and assisted him materially in reducing the Irish to subjection. He served his new master with zeal and fidelity, and few persons were more trusted or distinguished by him. Oliver becoming Protector, made Lord Broghill one of his privy-council and a member of his House of Lords. In 1656 he sent him to Scotland, with a commission to govern there with absolute authority for one year; and his conduct was such as proved satisfactory both to the Scots and the Protector. On the death of Cromwell, becoming aware of the approaching restoration of regal power, he exerted himself with such dexterity and success in promoting it as to obtain much credit for his conduct.

BOYLE — BOYTON

Charles II. rewarded him with the title of Earl of Orrery, and he was appointed one of the lords justices for Ireland.

Boyle, Virginia Frazer, American novelist: b. Chattanooga, Tenn. She was the daughter of Charles Frazer, a Confederate officer, and married Thomas R. Boyle, a lawyer of Memphis. She has published: 'Brokenburne'; 'Devil Tales' (1900); and has written extensively for periodicals.

Boyle Lectures, a series of discourses so named from the founder, Robert Boyle (q.v.), who left a bequest amounting to \$250 annually for this purpose, the theme of the lectures to be Christian apologetics. The first series was given in 1692 by Richard Bentley. Among Boyle lecturers whose discourses have been published since 1860 are: J. D. Maurice, C. Merivale, E. H. Plumptre, J. A. Hessey, and H. Wace. The lectures of this course are given annually in a series of eight at the Church of St.-Mary-le-Bow, London.

Boyle's Fuming Liquor, so called from having been invented by Robert Boyle (q.v.), a fetid, yellow liquid, obtained by distilling sal ammoniac with sulphur and lime. It is sometimes used in medicine under the name of *liquor fumans boylii*.

Boyle's Law. See GAS ILLUMINATION.

Boylston, Zabdiel, American physician: b. Brookline, Mass., 1680; d. Boston, 1 March 1766. He studied medicine, settled in Boston, and acquired a prosperous practice. In spite of the almost unanimous opposition of the medical profession and part of the public, he introduced the practice of inoculation for smallpox, having become a firm believer in it. Out of 286 persons inoculated in 1721-2 only six died, and he had the satisfaction of seeing the practice become general in New England long before it became so in England. He visited England in 1725 and was elected a Fellow of the Royal Society. Besides some papers published in the Transactions of that Society he wrote: 'Historical Account of the Smallpox Inoculated in New England, Upon All Sorts of Persons, Whites, Blacks, and of all Ages and Constitutions' (2d ed. 8vo London 1726; reprinted, Boston, 1730).

Boyne, boin, a river of Ireland, which rises in the Bog of Allen, County Kildare, and flows northeast through Meath to Drogheda, below which it enters the Irish Sea. It is navigable for barges up to Navan. The Boyne will ever be memorable in English history for the important victory gained on its banks about three miles above Drogheda, 1 July 1690, by the forces under the command of William III., over those of James II. Though James' personal courage was beyond all question, he, on this occasion, allowed the prudence of the sovereign to outweigh the impulses of the soldier. Of his troops 1,500 were killed and wounded, while William lost barely 500 men. In 1736 an obelisk, 150 feet high, was erected at Oldbridge, on the site of the battlefield, in commemoration of this victory. See ORANGEMEN.

Boynton, Edward Carlisle, American soldier: b. Vermont, about 1825; d. Newburg, N. Y., 13 May 1893. He was graduated from the Military Academy at West Point, N. Y.,

entered the artillery service, and in the war with Mexico was wounded at the battle of Churubusco. He was professor of chemistry at West Point, 1848-55, and in the University of Mississippi, 1858-61. He wrote a 'History of West Point' (1863); and a 'History of the United States Navy.'

Boynton, Henry Van Ness, American army officer: b. West Stockbridge, Mass., 22 July 1835; d. Atlantic City, N. J., 3 June 1905. He was graduated from Kentucky Military Institute in 1858; and was retained in the faculty of that institution. On the outbreak of the Civil War he resigned his office, and 27 July 1861 was commissioned major in the 35th Ohio Volunteers; was made lieutenant-colonel, 19 July 1863; and commanded the regiment at the engagement of Missionary Ridge, where he was severely wounded. He also commanded at Buzzard's Roost, and was brevetted brigadier-general for gallantry at Chickamauga and Chattanooga. After the war he became a newspaper correspondent. He published 'Sherman's Historical Raid' or 'The Memoirs in the Light of the Record, a Review Based upon Compilations from the Files of the War Office' (1875). He headed the opposition in 1887 to President Cleveland's order for the return of the Confederate battle flags. In 1894 he received a Congressional Medal of Honor for distinguished bravery at Missionary Ridge, and in 1898 was appointed a brigadier-general of volunteers for the war with Spain, and was in command of Camp Thomas, Chickamauga, after 15 August. He became chairman of the Chickamauga and Chattanooga National Military Park Commission and president of the board of education of the District of Columbia.

Boy's Clubs, organizations in which boys constitute the membership. Among clubs formed by boys on their own initiation, those for games and athletics seem to predominate very largely. Clubs for hunting, fighting, etc., are also popular. Sometimes the organizations have a distinctly literary or musical character and sometimes they are chiefly social in their nature. Numbers of clubs are formed for industrial purposes, but judging from statistics secret societies do not meet with as great a degree of favor as would naturally be supposed. These societies for boys are organized by adults; the aims are in general to keep boys from bad surroundings and stimulate them to nobler ideals of life, to refine their taste and encourage them in habits of thrift, industry, and study. Clubs in large cities sometimes have hundreds of members and provide fine buildings, in which opportunity is offered for a variety of activities ranging from manual training and other forms of instruction to social entertainment. The religious interests of the boys are also cared for in various ways. The clubs connected with social settlements are often small, thus affording a better opportunity for reaching the boys personally, an end difficult of achievement in societies with large membership. See Forbush, 'How to Keep Boys' (1900); Forbush, 'The Boy Problem' (1901); Newman, 'The Boys' Club in Theory and Practice' (1900).

Boy'ton, Paul, Irish-American swimmer: b. Dublin, 29 June 1848. He served in the United States navy, 1863-5, and was connected

with the United States life-saving service, 1867-9. He invented a rubber life-preserving suit, in which, in 1874, he leaped from a vessel off the coast of Ireland, and, after remaining seven hours in the water, reached land safely. On 28 May 1875 he crossed the English Channel in this suit, swimming across in 24 hours. In 1876 he made the run from the Bayou Goula to New Orleans, La., 100 miles, in 24 hours. In May, the same year, he descended the Danube from Linz to Budapest, 460 miles, in six days. Later he went from Oil City, Pa., to the Gulf of Mexico, 2,342 miles, in 80 days, being exposed at first to great cold and later to extreme heat. In November 1879, he descended the Connecticut River from Canada to Long Island Sound. On 17 Sept. 1881, he started from Cedar Creek, Mont., to swim to St. Louis, Mo., and accomplished the long journey, 3,580 miles, 20 November. In 1888 he made a voyage down the Ohio River. He published an account of his adventures under the title, 'Roughing It' (1886).

Boz, bōz, a pseudonym used by Charles Dickens in the publication of 'Sketches by Boz.' That the pronunciation of this name now in vogue is not correct is shown by Dickens' explanation of its origin. A younger brother of the author had in childhood received from the latter the nickname Moses, "which being facetiously pronounced through the nose became Bōses, and being shortened became Bōz."

Bozeman, bōz'mān, Mont., a city and county-seat of Gallatin County, on the Northern P. R.R., in the midst of a region of valuable ores, such as gold, silver, coal, and iron. Its industries are breweries, flour and lumber mills, brickyards, stone quarries, and the like, and it contains the State College of Agriculture and Mechanic Arts, opened in 1893. Pop. (1910) 5,107.

Bozen, a town of the Austrian Tyrol, 32 miles northeast of Trent; situated in a hilly region at the junction of the Talfer and Eisak, and on the Brenner Railway. The situation of the town in relation to Germany, Switzerland, and Italy, makes it an important trade centre. There are four annual fairs; the canning of fruit and vegetables is carried on, and manufactures of silk and linen. Among the public buildings are a Gothic church, castle, monastery, and gymnasium.

Bozman, bōz'mān, John Leeds, American historian and jurist: b. Talbot County, Md., 25 Aug. 1757; d. there, 23 April 1823. He studied law in London, and afterward practised that profession in his native State, where for several years he acted as deputy attorney-general. His legal reputation, however, rests upon the various law tracts which he published from time to time, as legal questions arose in the courts. He wrote a 'Historical and Philosophical Sketch of the Prime Causes of the Revolutionary War,' in which he praised Washington, and condemned Franklin; but it was suppressed. During the administration of Washington and the elder Adams, he wrote much in the journals of the day, and at a later period in Dennie's 'Portfolio.' In 1822 he published at Washington an essay on the colonization society, in which he discussed the question of the origin of races. His literary reputation

chiefly rests on his 'History of Maryland, from the Earliest Settlement in 1633, to the Restoration in 1660,' a posthumous work, published in 1836, under the auspices of the general assembly of that State.

Boz'rah, bōz'ra, an ancient city of Palestine, east of the Jordan, and about 80 miles south of Damascus. It was the capital of Og, king of Bashan, and subsequently belonged to the tribe of Manasseh. Early in the Christian era, it became a flourishing place, and was long a great emporium of trade. It is now a scene of ruins.

Bozzaris, Marcos, mār'cōs bō'tsā-res, a hero of the Greek war of independence against the Turks: b. Suli, in Epirus, about 1790; d. Missolonghi, 1823. He was descended from a Suliote family renowned for its bravery, and after the fall of Suli retired to the Ionian Islands, from whence he made a vain attempt to deliver his native country. He then entered an Albanian regiment in the French service, and in 1813 became a member of the Hetæria, a society formed for national regeneration. In 1820, when the Turks were carrying on war against Ali Pasha, the latter sought aid from the exiled Suliotes, and Marcos Bozzaris returned to Epirus. On the outbreak of the war of independence he at once joined the Greek cause, and distinguished himself as much by his patriotism and disinterestedness as by his military skill and personal bravery. In 1822 he took part in the war which was going on in western Greece, and acquired special renown by his defense of Missolonghi. In the summer of 1823, when he held the command-in-chief of the Greek forces in that port, he was dangerously wounded at a night attack on the camp of the Pasha of Scutari, near Karpenisi, and died soon after. His deeds are still celebrated by the Greeks in many popular songs. Through Halleck's spirited poem, 'Marco Bozzaris,' his name and fame have been made familiar to several generations of American school boys.

Brabançonne, bra-bān-sūn, the national song of the Belgians during the revolution of 1830, composed by Jenneval, at that time an actor at the theatre of Brussels, and set to music by Campenhout. Every verse of the song ends with the refrain:

"La mitraille a brisé l'orange
Sur l'arbre de la liberté."

Brabançons, bra-bān-sōn, a class of adventurers and lawless soldiers in the Middle Ages, ready to fight for pay on either side and in any quarter. They derive their name from Brabant, the chief nursery of these troops, and were particularly notorious in France in the 12th century.

Brabant, brā'bānt, or bra-bānt', the central district of the lowlands of Holland and Belgium, extending over an area of 4,341 square miles, from the left bank of the Waal to the sources of the Dyle, and from the Meuse and the plains of Limburg to the lower Scheldt. In the Middle Ages it formed a separate independent duchy, called Lower Lorraine. It is divided at present between the kingdoms of Holland and Belgium, into three provinces: (1) Dutch or North Brabant, with an area of 1,980 square miles; (2) the Belgian province

BRABOURNE—BRACCIO DA MONTONE

of Antwerp, with an area of 1,093 square miles; (3) the Belgian province of South Brabant, with an area of 1,268 square miles. The country is comprehended in a plain, gently sloping to the northwest, occupied in the north by heathy and marshy tracts, and in the south passing into the gentle rising ground which forms the first ascent of the forest of Ardennes. It is copiously watered by the Meuse in the north and the Scheldt in the south, in the former of which the internal transit is furthered by means of canals, among others the South William and the Breda canals, and in the latter by railways, which have their point of union at Mechlin. Under the influence of a northerly, indeed, and moist, but in general healthful and mild climate, the great fertility of the soil renders agriculture and the raising of cattle the principal and most profitable employment of the inhabitants. With this is associated the general diffusion of an active industry, which supports an extensive trade, consisting chiefly of lace, cotton, woolen, and leather goods.

Through Cæsar's campaigns the Romans became acquainted with the inhabitants of Brabant as a mixed race of Germans and Celts. The Menapians, particularly, inhabiting the country between the Rhine, the Meuse, and the Scheldt, made, as the most powerful and warlike among the various tribes, a gallant though ultimately ineffectual resistance to the Roman arms, by whose conquests this portion of Lower Germany was incorporated with the province of Gallia Belgica. In the 5th century the Franks gained possession of Brabant, which in the sixth was, at the partition of the Frank kingdom, assigned to the primitive country of Austrasia; in the 9th century it was united to Lorraine; and on the division of the latter, in 870, became the property of France, from which, however, in the commencement of the 10th century, it was transferred by Henry I. again to Lorraine; in 959 to Lower Lorraine, and thus to Germany. In the beginning of the 11th century it was separated from Lorraine, on Duke Otho, the son of Charles the Fat, who had been invested by the Emperor Otho with Lower Lorraine, dying childless in 1005. After this several Counts of Ardennes and Godfrey of Bouillon possessed it till 1076; the Emperor Henry V. mortgaged it to Godfrey the Bearded, of the family of the Counts of Louvain and Brussels, whose house reigned over Brabant to the middle of the 14th century. As early as 1190 we find the title of Duke of Brabant, in which the former title of Duke of Lower Lorraine or Lothier was gradually absorbed. Under the government of its own dukes Brabant gained rapidly in power and independence, but was engaged in numerous contests with its neighbors, and shifted much in its leanings between Germany and France. Of the six dukes of Brabant, Henry I., II., and III., and John I., II., and III., there are more especially to be mentioned John I., who, by the celebrated battle of Wöringen (1288), united Limburg to Brabant, and is also renowned in Germany as a minnesinger or troubadour, and John III., who, in 1349, received, from the Emperor Charles IV. the important privilege of a free judicature, under the name of the Brabantine Golden Bull, in consequence of which his subjects ceased to be amenable to any foreign

jurisdiction. With John III. the male heirs of the family of the Counts of Louvain became extinct in 1355, and, by the bequest of his daughter, Joanna, who reigned till 1406, and married Wenceslaus of Luxemburg, Brabant came into the possession of the house of Burgundy, and in the first instance to Antony of Burgundy, Joanna's grand-nephew, and second son of Philip the Bold. On Antony's death at the battle of Agincourt, in 1415, and his two successors, his son, John IV., and his brother, Philip, Count of St. Pol, dying childless respectively in 1427 and 1430, Brabant, as the inheritance of Philip the Good, became formally incorporated with the dominions of the house of Burgundy. In this state, however, it did not long continue, and, by the marriage of Mary of Burgundy with the Emperor Maximilian, was transferred to the house of Austria, and subsequently to the Emperor Charles V., who abdicated in favor of his son, Philip II., of Spain. The persecuting edict of the latter, and the Duke of Alva's cruelties, excited a revolt in Brabant, but it was only the northern portion (Hertogenbosch) which succeeded in asserting its independence, and in 1648 was incorporated with the United Provinces under the name of the Generality Territory, while South Brabant remained till 1714 in the possession of the Spaniards. On the extinction of the Spanish-Austrian line in the latter year, Brabant, with the other southern provinces of the Netherlands, reverted to the imperial house of Austria, which, however, was unable long to retain it in peace. On a violent contest breaking out under the Emperor Joseph II., as to the explanation of the provincial privileges which Brabant possessed under the *Joyeuse Entrée* (q.v.), and the consequent dismissal of the assembly of the states of Brabant and Limburg, the Brabantines assembled of their own authority, and boldly pronounced the separation of Brabant from the supremacy of the house of Austria. Leopold II. settled the dispute after Joseph's death by granting their ancient privileges to the people of Brabant. See BELGIUM.

Brabourne, Edward Huggessen Knatchbull-Huggessen, Lord, English juvenile story writer: b. Mersham Hatch, Kent, 29 April 1829; d. 6 Feb. 1893. His literary fame is due mostly to his stories for children, including: 'Crackers for Christmas' (1870); 'Moonshine' (1871); 'Stories for My Children' (1869); 'Tales at Tea Time' (1872); 'Queer Folk' (1873); 'River Legends' (1874); 'Uncle Joe's Stories' (1878); 'Friends from Fairyland' (1885). He also published 'The Truth About the Transvaal' (1881), and edited the 'Letters of Jane Austen,' his great-aunt (1885).

Braccio da Montone, Andrea, ân-dră'ă bră'chō-da-mōn-tō'nē, Italian captain: b. Perugia, of the illustrious family of the Fortebracci, 1368; d. 1424. He early embraced the profession of arms, and entered the service of Ladislás, king of Naples, under the promise that he, if successful, would make him master of Perugia; but when the Perugians, determined to keep out Braccio, offered to open their gates to Ladislás, if he would retain it for himself, he broke faith with Braccio, and accepted their terms. Braccio next served under Florence, afterward attaching himself to

Pope John XXIII., who, on repairing to the council of Constance, where he was deposed, intrusted Braccio with the defense of Bologna. Ladislas being now dead, and the Church without a head, Braccio saw that the moment for which he had waited had arrived; and allowing the Bolognese to redeem their liberty by a money payment, suddenly, in 1416, pounced on Perugia. The Perugians vainly endeavored to resist, and saw themselves, compelled to receive Braccio as their lord. His rule, though firm and occasionally severe, was milder than might have been anticipated; and he soon showed that his wisdom as a statesman was not less than his ability as a captain. Though Braccio had now gained the great object of his life, ambition led him to attempt the conquest of Rome, and he gained several advantages over Sforza, who had long been his rival. Ultimately, however, the new Pope, Martin V., proved more than a match for him, and Braccio, defeated and severely wounded, took the disgrace seriously and would neither take food nor allow his wounds to be examined.

Bracciolini, Poggio Giovanni Francesco, pōdǵō brā-chō-lē'ē, Italian classical scholar: b. Terra Nuova, near Arezzo, 11 Feb. 1380; d. Florence, 30 Oct. 1459. In 1416 he undertook the laborious task of searching the ancient monasteries for manuscripts, and succeeded in recovering seven orations of Cicero, and a great number of other classical writings. Having impoverished himself in these researches, he accepted an invitation of Cardinal Beaufort to go to England, but, disappointed in his hopes of preferment, and in the literary atmosphere of the country, returned to Italy in 1421, and became apostolic secretary to Martin V. and to several succeeding popes, having served not less than eight popes in the same capacity. On the appearance of the plague at Rome in 1450, he withdrew to Florence, where he was chosen chancellor three years afterward. His 'History of Florence' (translated by his son Jacopo, from Latin into Italian) comprises the period from 1350 to 1455. Among his most finished productions is his 'Dialogue on Nobility.' His writings are on moral, philosophical, and controversial subjects, and comprise many translations, orations, and letters, the latter deriving peculiar interest from their reference to contemporary life. His works have not yet been properly collected, the Basel edition of 1538 being considered imperfect. His biography, by Rev. William Shepherd (1802), was translated into Italian, German, and French.

Brace, Charles Loring, American author and philanthropist: b. Litchfield, Conn., 19 June 1826; d. Campier, Switzerland, 11 Aug. 1890. He graduated at Yale in 1846, and studied theology, but held no pastorate. He devoted himself to philanthropy in New York, and lectured, wrote, and worked to enlist aid for the children of the poor. His books include: 'Hungary in 1851' (New York 1852); 'Home Life in Germany' (1853); 'The Norse Folk' (1857); 'Short Sermons to Newsboys' (1861); 'The Dangerous Classes of New York and Twenty Years' Work Among Them' (1872, 3d ed. 1880); 'Free Trade as Promoting Peace and Good Will Among Men' (1879); 'Gesta Christi' (1883), a review of the achievements

of Christianity from the earliest days in bettering the moral and social condition of the world; and 'To the Unknown God' (1889).

Brace, De Witt Bristol, American physicist: b. Wilson, N. Y., 1859. He graduated at Boston University, 1881; took post-graduate courses at Johns Hopkins, and received his degree of Ph.D., from the University of Berlin, Germany. Since 1887 he has been professor of physics at the University of Nebraska, and has made a special study of radiation and optics. He has written: 'Laws of Radiation and Absorption' (1901).

Brace, Julia, American blind deaf-mute: b. Newington, Conn., 13 June, 1806; d. Bloomington, Conn., 12 Aug. 1884. She lost both sight and hearing at the age of four years and five months, and soon forgot the few words she had learned to speak. At the age of 18 she entered the American asylum for the deaf and dumb at Hartford, then under the care of the Rev. Dr. Gallaudet, in which institution she remained for the greater part of her life. Never prepossessing in her appearance, and at her admission, in consequence of over-indulgence, selfish, sullen, and exacting, her case was one of great difficulty. The existence of the triple infirmity under which she labored was hardly known at that time, and she was regarded, consequently, as a psychological curiosity. As compared with some other blind deaf-mutes, whose history has been recorded within a few years past, she did not seem possessed of any extraordinary abilities, and, but for her misfortune, would probably have passed as a very ordinary woman. In all that concerned the outward and physical nature she manifested much intelligence. She sewed very well, threading her needle readily with her fingers and tongue; was very neat and particular in her dress, and exhibited marked habits of order. She possessed great tenacity of memory and nice powers of discrimination. She kept herself apprised of the progress of time, days, weeks, and months, but in her intellectual education never made much progress. Limited as was her knowledge of the alphabet of religion, she was not wanting in manifestations of the moral sense. She appeared to have a perception of right and wrong, and while tenacious of her own rights, did not knowingly invade those of others.

Brace, a beam or bar employed to stiffen a framed structure. In a roof or bridge truss this bar is placed in an inclined position and serves to bind together the principal members. The tool for holding a bit, which carpenters employ in boring, is called a brace, while in nautical phraseology braces are ropes fastened to the yard-arms by means of which sails are shifted horizontally around the masts to catch a particular breeze. In all forms of construction a brace supports by resistance to compression and is thus opposed to a tie or strut which furnishes support by resistance to tension.

Bracebridge Hall, a series of studies of English life by Washington Irving, published in 1822 with the pseudonym 'Geoffrey Crayon, Gent.'

Bracegirdle, Anne, English actress: b. about 1663; d. London, 1748. She appeared on the stage as a child in 'The Orphan,' and from 1688 appeared in many popular plays of that

BRACELET — BRACHIOPODS

time, including several tragic roles, although her forte seems to have been comedy. She was noted for her beauty and numbered adorers by hundreds. She left the stage in 1707. See Russell, 'Representative Actors' (1875); Baker, 'English Actors' (1879).

Bracelet, an ornament usually worn on the wrist, the use of which extends from the most ancient times down to the present, and belongs to all countries, civilized as well as uncivilized. The word has come to us from the French and is ultimately derived from *brachium*, the Latin word for the arm. Bracelets were in use in Egypt at a very remote period. They were of different colors, painted on them in enamel in very bright as well as very delicate shades. They were also then as now frequently made of gold, encased with various kinds of precious stones. They were not always worn, as with us, on the wrist, but frequently on the upper part of the arm. The ancient Medes and Persians were well known to be extremely fond of this method of adorning themselves; and in the Bible the bracelet is frequently mentioned as an ornament in use among the Jews, both men and women. Among the ancient Greeks, in historical times, bracelets do not appear to have been worn by the men; but, on the other hand, they were worn by the Greek ladies, made of every variety of material, and in every possible form. A preference was generally given to the spiral form, and a bracelet of this kind is described by Homer in the *Iliad*. Very frequently the spiral bracelets were made to assume the appearance of snakes, which went round the arm twice or thrice, or even a greater number of times. Among the ancient Italian tribes bracelets were also an ornament of the men. The Sabines often wore very heavy ones on the left arm. Among the Romans it was a frequent practice for a general to bestow bracelets on soldiers who had distinguished themselves by their valor. Roman ladies of high rank frequently wore them both on the wrist and on the upper arm. The Arabs and the Orientals generally use them, chiefly as an ornament for women. Among the ancient heathen Germanic tribes they formed the chief and almost only ornament, as is shown by their being so often found in old graves. The men seem to have used them even more than the women, for bracelets have been found in dozens on the arms of the former. The spiral was the favorite form with the ancient Germans as with the ancient Greeks.

Brachial (brá'ki-ál) **Artery**. See **ARTERIES**.

Brachial Plexus. See **NERVES**.

Brachiopoda, or **Brachipoda**, brák'-i-ô-pôds, the class of shelled worms, formerly placed among mollusks. The class is named *Brachiopoda* from the feet-like arms, fringed with tentacles, coiled up within the shell, and which correspond to the lophophore of the Polyzoa and the crown of tentacles of the Sabella-like worms. The shell, which lives attached to rocks, is in shape somewhat like an ancient Roman lamp, the ventral and larger valve, being perforated at the base for the passage through it of a peduncle by which the animal is attached to rocks. The shell is secreted by the skin (ectoderm), and is composed of carbonate (Terebratulina) or largely (Lingula) of phosphate of lime.

The body of Brachiopods is divided into two parts, the anterior or thoracic, comprising the main body-cavity in which the arms and viscera are contained, and the caudal portion, that is, the peduncle. The part of the body in which the viscera lodge is rather small in proportion to the entire animal, the interior of the shell being lined with two broad lobes, the free edges of which are thickened and bear setæ, as seen distinctly in *Lingula*. The body-cavity is closed anteriorly by a membrane which separates it from the space in which the arms are coiled up. The pallial chamber is situated between the two lobes of the mantle (*pallium*) and in front of the membrane forming the anterior wall of the body-cavity. In the middle of this pallial chamber the mouth opens, bounded on each side by the base of the arms. The latter arise from a cartilaginous base, and bear ciliated tentacles, much as in the worm *Sabella*. In *Lingula*, *Diseina*, and *Rhynchonella*, they are developed, in a closely wound spiral, as in the genuine worms (*Amphitrite*). In *Lingula* the arms can be partially unwound, while in *Rhynchonella* they can not only be unwound but protruded from the pallial chamber. In many recent and fossil forms the arms are supported by loop-like solid processes of the dorsal valve of the shell, but when these processes are present the arms cannot be protruded beyond the shell. The tentacles or cirri on the arms are used to convey to the mouth particles of food, and they also are respiratory in function, there being a rapid circulation of blood in each tentacle, which is hollow, communicating with the blood-sinus or hollow in each arm, the sinus ending in a sac on each side of the mouth.

The digestive system consists of a mouth, cesophagus, stomach, with a liver-mass on each side, and an intestine. The mouth is bordered by two membranous, highly sensitive and movable lips. The stomach is a simple dilatation of the alimentary canal, into which empty the short ducts of the liver, which is composed of masses of cæca. The liver originally arises as two diverticula or offshoots of the stomach. The short intestine ends in a blind sac or in a vent, and is, with the stomach, freely suspended in the perivisceral cavity by delicate membranes springing from the walls of the body.

The nervous system consists of two small ganglia above, and an infræcesophageal pair of larger ganglia, and there are two elongated ganglia behind the arms, from which nerves are given off to the dorsal or anterior lobe of the mantle.

The larva is top-shaped (trochosphere) and is quite active, swimming rapidly about in every direction.

While in their development the *Brachiopoda* recall the larvæ of the true worms; they resemble the adult worms in the general arrangement of the arms and viscera, though they lack the highly developed nervous system of the Annelids, as well as a vascular system, while the body is not jointed. On the other hand they are closely related to the Polyzoa, and it seems probable that the Brachiopods and Polyzoa were derived from common low vermician ancestors, while the true Annelids probably sprang independently from a higher ancestry. They are also a generalized type, having some molluscan features, such as a solid shell, though having

nothing homologous with the foot, the shell-gland or odontophore of mollusks.

In accordance with the fact that the Brachiopods are a generalized type of worms, the species have a high antiquity, and the type is remarkably persistent. The *Lingula* of our shores (*Glottidia pyramidata*) lives buried in the sand, where it forms tubes of sand around the peduncle, just below low-water mark from Chesapeake Bay to Florida. It has remarkable vitality, not only withstanding the changes of temperature and exposure to death from various other causes, but will bear transportation to other countries in sea-water that has been unchanged. Living *lingulæ* have been carried from Japan to Boston, Mass., the water in the small glass jar containing the specimens having been changed but twice in four months. The living species of this cosmopolitan genus differ but slightly from those occurring in the lowest fossiliferous strata. Between 80 and 90 living species are known, most of them living, except *Lingula*, which is tropical, in the temperate or arctic seas, while nearly 2,000 fossil species are known. The type attained its maximum in the Silurian age, and in Palæozoic times a few species, as *Atrypa reticularis*, extended through an entire system of rocks and inhabited the seas of both hemispheres.

Consult Littell-Eastman, 'Text-book of Palæontology' (New York 1900).

Bracht, bränt, Felix Prosper Eugen, German artist, b. Morges, Switzerland, 1842. He is best known as a landscape artist. He studied at Karlsruhe and Düsseldorf, and in 1882 was appointed a professor in the Berlin Academy. Among notable paintings by him are 'Stormy Evening on Rügen'; 'Moonlight Night in the Desert'; 'Nightfall on the Dead Sea.' The last named work, now in the National Gallery of Berlin, is considered his best.

Brachvogel, Emil, ä'mël branh'fō-gël, German novelist and dramatist: b. Breslau, 1824; d. 1878. He is best known by his drama, 'Narcisse' (1857), which attained many editions and was translated into various European tongues. 'Beaumarchais' (1865); 'Benoni' (1860); and 'Glencarty' (1872).

Brachyura, brāk-i-ū'ra, a sub-order of decapodous crustaceans, containing those families in which the abdomen is converted into a short jointed tail folding closely under the breast. The common crab is a familiar example of this group. See CRUSTACEA.

Brack'en (*Pterisaquilina*), a well-known species of polypodiaceous fern, forming the type of the sub-family *Pteridea*. It has a black, creeping rhizome, from which are sent up large, handsome bipinnate fronds. The sori are arranged along the margins of the pinnules, and are covered by a false indusium formed of the reflexed margin. The bracken or brake is very common in Great Britain where it frequently covers large extents of country. Its root-stock was at one time used for food, but it is neither palatable nor nutritious; that of a New Zealand species (*P. esculenta*) is better suited for this purpose. Various medicinal virtues have been at one time or another ascribed to it, but it is not now used in medicine. The ash produced by burning the fronds has been employed in making soap. Other species are met

with in various parts of the world. In verse the word is often loosely employed to indicate ferns in general.

Brack'enbury, Charles Booth, English soldier and military writer: b. Bayswater, Middlesex, 7 Nov. 1831. He served in the Crimean war in 1855; accompanied the Prussian army in the war with Austria (1866), and the Franco-Prussian war (1870-71), and was with the Russian army in the Russo-Turkish war (1877-8). His works include 'European Armaments' (1867); 'The Winter Campaign of Prince Frederick Charles in 1870-71'; 'Reforms of the French Army' (1874), etc.

Brackenbury, Sir Henry, English soldier: b. Bolingbroke, Lincolnshire, September 1837. He entered the Royal Artillery in 1856, served in the central Indian, Ashanti and Zulu campaigns and was made lieutenant-general in 1888, and director-general at the war office in 1890. He has published 'Fanti and Ashanti' (1873); 'Narrative of the Ashanti War' (1874); 'The River Column' (1885).

Brack'enridge, Henry Marie, American author: b. Pittsburg, Pa., 11 May 1786; d. there 18 Jan., 1871. He was educated by his father, H. H. Brackenridge (q.v.) and admitted to the bar 1806. In 1811 he descended the Mississippi River in a "keel-boat" to New Orleans, and was soon appointed deputy attorney-general for the then territory of Orleans, becoming district judge in 1812. In 1817 he was secretary to the commission sent to the South American republics, and in 1821 was appointed U. S. judge for the western district of Florida, holding it until he removed to Pittsburg in 1832. His knowledge of the French and Spanish languages and laws made him of considerable service to the government in all affairs connected with the Louisiana and Florida purchases. He wrote 'Views of Louisiana in 1810' (1812); 'Letter to Mr. Monroe. By an American'; 'Voyage to South America in 1817-18' (1818); 'History of the Late War [1812] between the United States and Great Britain'; 'Recollections of Persons and Places in the West' (1834); 'Essays on Trusts and Trustees' (1842); 'History of the Western Insurrection' (1850), a vindication of his father's share in that affair.

Brackenridge, Hugh Henry, American jurist: b. near Campbellton, Scotland, 1748; d. Carlisle, Pa., 25 June 1816. He came with his father to the United States at the age of five, and was graduated from Princeton in 1771. During the American Revolution he was a chaplain in the army. After being admitted to the bar he removed to Pittsburg, became prominent in his profession, and during the "Whisky Insurrection" (1794) was influential in bringing about a settlement between the government and the malcontents. In 1799 he was appointed to the supreme bench of Pennsylvania. A man of literary tastes, he wrote a number of pieces much thought of in their day. At his graduation he wrote (with Philip Freneau) a poetical dialogue 'The Rising Glory of America.' Other works by him are 'Incidents of the Insurrection in Western Pennsylvania' (1795); 'Law Miscellanies' (1814); 'Modern Chivalry, or the Adventures of Captain Farrago and Teague O'Regan, His Servant,' a political satire and his best work (1st Pt. 1796; 2d, 1806).

BRACKET — BRADDOCK

Bracket, a short piece or combination of pieces, generally more or less triangular in outline, projecting from a wall or other surface. They may be either of an ornamental order, as when designed to support a statue, a bust, or such like, or plain forms of carpentry, such as support shelves, etc. Brackets may also be used in connection with machinery, being attached to walls, beams, etc., to sustain a line of shafting.

Brack'ett, Anna Callender, American educator: b. Boston, 21 May 1836. She taught in various normal schools, being the first woman principal of such an institution, and was principal of a private school for girls in New York for 20 years. She has published 'Education of American Girls' (1874); 'Philosophy of Education,' from the German (1886); 'Technique of Rest' (1892); 'Woman and the Higher Education' (1893).

Brackett, Frank Parkhurst, American mathematician: b. Provincetown, Mass., 1865. He graduated at Dartmouth College in 1887, and since 1890 has been professor of mathematics and astronomy at Pomona College, Claremont, California. He has written several important mathematical and meteorological papers.

Brackett, Gustavus B., American pomologist: b. Unity, Maine, 24 March 1827. He served in the Civil War, and, at its close, took up the study of horticulture and pomology. He served as an expert at the Paris Exposition (1878) and the Chicago World's Fair (1893), after which he became chief of the Division of Pomology in the United States Department of Agriculture.

Brackett, John Quincy Adams, American lawyer: b. Bradford, N. H., 8 June 1842. After studying law at the Harvard Law School he began the practice of his profession in Boston. He sat for several terms in the Massachusetts legislature (1877-82 and 1884-7), being speaker of the House (1885-7); was lieutenant-governor of the State (1887-90), and governor of Massachusetts (1890-91).

Bracquemond, Joseph Felix, zhō-zěf fā-lěks brāk-mōn, French artist and engraver: b. Paris, 1833. He first exhibited in the Salon of 1852 and his etchings and reproductions of noted masters speedily brought him into notice. His portraits are especially prized and as an etcher he is represented by over 800 plates. He has invented a new method of china decoration and has done much work for the porcelain establishments at Limoges.

Bract, a leaf, from the axil of which a flower or flower-stalk develops, and thus distinguished from the ordinary leaf, from the axil of which the leaf-bud proceeds. Bracts may thus be entirely similar to the ordinary leaves of a plant, in which case they are called leafy bracts; but very commonly they are somewhat changed in form, and although they may be sometimes divided, they are for the most part entire, even when the ordinary leaves are divided. In some cases they are so much changed in form as to be mere scales or threads, and sometimes they are not developed at all, in which case the inflorescence is said to be ebracteate. Owing to the different ways in which the bract appears, it may in some plants be con-

founded with the calyx, in others with the corolla. When the flowers of a plant are sessile, the bracts are often applied closely to the calyx, and are thus apt to be confounded with it; and when the bracts are colored, they are apt to be mistaken for parts of the corolla. When the inflorescence of a plant is branching, subordinate flower-stalks proceeding from one main flower-stalk, bracts are often seen at the base of the former, and these are called bracteoles. A spathe is a kind of large bract.

Brac'teates, thin coins of gold or silver, with irregular figures on them, stamped upon one surface only, so that the impression appears raised on one side, while on the other it appears hollow. They were largely circulated under Otho I., emperor of Germany, and derive their name from *bractea*, signifying leaf of gold or other metal. They are of importance as illustrating history. Bracteated coins, or *bracteati nummi*, is a term used to signify coins or medals covered over with a thin plate of some richer metal. They were usually made of iron, copper, or brass, plated over and edged with gold or silver leaf.

Brac'ton, Henry de, one of the earliest writers on English law, flourished in the 13th century. He studied civil and canon law at Oxford, and about the year 1244, Henry III. made him one of his judges itinerant. Some writers say that he was afterward chief-justice of England; but his fame at present is derived from his legal treatise entitled 'De Legibus et Consuetudinibus Angliæ,' first printed in 1569 (folio). The quarto edition of 1640 was merely a reprint of the first. In 1878-83 Sir Travers Twiss issued a recension and translation in six volumes. See Scrutton, 'Influence of the Roman Law on the Law of England' (1885).

Brad'bury, William Batchelder, American musician: b. York, Me., 6 Oct. 1816; d. Montclair, N. J., 7 Jan. 1868. In 1840 he began teaching in New York and Brooklyn. In 1847-8 he went to Europe, where he pursued musical studies under Hauptmann and others. He is best known as the composer and publisher of musical collections for schools and choirs, 59 separate works being credited to him. His most important works are 'Young Choir' (1841); 'Flora's Festival' (1845); 'The Golden Cham' (1861); 'Pilgrim Song' (1863); 'The Golden Trio' (1864); 'The Shawm' (1864); 'The Jubilee' (1865); 'Temple Choir'; 'Fresh Laurels' (1867), his last work.

Braddock, Pa., a borough in Allegheny County; on the Monongahela river, and on the Pennsylvania, the Baltimore & O., and the Pittsburg & L. E. R.R.'s; 10 miles above Pittsburg. There are extensive blast furnaces and manufactories of steel rails, steel wire, pig-iron, cement, plaster, etc. The four banks and two trust companies have a combined capitalization of \$1,250,000. Braddock has a Carnegie Free Library, a hospital, numerous churches, and public and high schools. The borough was first settled in 1795 on the site of Braddock's defeat and was incorporated in 1867. The government is vested in a burgess and a council of 12 members elected for three years. Pop. (1910) 19,357.

Brad'dock, Edward, British, general: b. Perthshire, Scotland, about 1695; d. Great Meadows, Pa., 13 July 1755. Through his

BRADDOCK

father, an officer in the Coldstream Guards, who rose to be a lieutenant-colonel there and major-general of the line, he became in 1710 an ensign in that body, the haughty *élite* of British troops; which had the Duke of Cumberland, captain-general of the whole army, for one of its colonels, men of rank for subalterns, and its very privates chosen by other bodies for commissioned officers. Appointed captain in 1736, he rose to lieutenant-colonel by service on the Continent 1742-5, including Cumberland's battle of Fontenoy in 1745, where the Coldstreams covered themselves with glory; and in 1754 was made major-general of the line, thus paralleling his father. In that year an expedition to destroy the French power in America was resolved on; and on 24 September Braddock was made generalissimo of all the forces there, beyond question as being the officer known to Cumberland who was best able to accomplish the task. But his experience made him overrate formal discipline, and underrate (not only in action but in expert counsel) both foes and allies who lacked it; he could not fully realize new dangers nor appreciate methods of meeting them; he was hot of temper, rough of speech, overbearing in argument, obstinate in opinion; and these, with the martinetism natural enough in an officer of 60 after 43 years of the Coldstreams, and which were not vital in a drilled service, fatally alienated those in the new land on whom he had to depend for safety. Yet he was quick to recognize ability, and warm in acknowledging it; he regarded Washington and Franklin, the former but 22, as the greatest men in the colonies; and when the royal order of 1754 ranking all colonial commissions below all English ones prevented Washington from joining him, he sent a handsome letter asking the latter to be one of his military family, and voluntarily promised to use his influence in securing him a regular English commission. Landing at Hampton Roads, Va., 20 Feb. 1755, he attempted to collect men and stores for his expedition against Fort Duquesne (Pittsburg), but was baffled for many weeks by the sloth, rapacity, and unpatriotic local factions of the colonies, who did their best to justify the contempt with which he heartily if injudiciously visited them. The lack of men, supplies, transportation, and money delayed the expedition to its ruin. He tried to secure a large body of Indians for scouts and allies, but only obtained 40 or 50. He let all but eight of them go through bad judgment, and disgusted those so greatly by his manners that one of them deserted, and the rest warned their friends against coming near. The famous Indian hunter, Capt. Jack, wished to join him, but Braddock refused unless he would conform to military discipline, which the old scout would not do. Finally the expedition started from Fort Cumberland (now Cumberland, Md.) the first week in June, with 2,150 men. The march was most toilsome and slow, involving cutting roads, bridging streams, making causeways, passing through swamps, etc.; and on the 18th, at Little Meadows, 1,200 picked men were chosen to continue the expedition, the rest being left behind under Dunbar. On the night of 4 July he halted two days about 25 miles from his destination, to wait the reports of his Indian scouts and convoy of provisions from Dunbar's camp—to his destruction but not to his blame. Reaching Turtle (now Rush) Creek the road

suddenly ended at a precipice impassable for artillery and wagons, and he decided to quit the ridge, where ambuscade was impossible, and make a double fording across an elbow of the Monongahela. Meantime the French commander, Contrecoeur, had decided to withdraw without a blow, but a Capt. Beaujeu asked leave to take a detachment and resist the passage of the second ford, eight miles off. He was given about 200 white troops, and by a brilliant appeal on the morning of the 9th to the Indians, who at first hung back, obtained several hundred of them also. When he came in sight of the English, they had already crossed, and advanced so that both flanks would be exposed for some 200 yards to an enemy who occupied the deep ravines, thick with tangled forest growth and vines, that seamed the river bluff. Braddock's ruinous error was in not beating up ahead on his flanks, as Col. Sir Peter Halket urgently besought him to do the night before; thereby he marched straight into the worst of ambushes. Into these the Indians glided, while the white troops barred the English path in front; and the head of the advancing column went down under a storm of lead. Shaken for a moment, the vanguard moved against the concentric ring; and after another terrible discharge, returned it with a volley that swept away every enemy in sight, and struck Beaujeu and a dozen others dead. The Indians turned to fly; rallied by the other French officers, they returned to cover, and under their unerring fire the English advance broke and retreated; mixing with the rear in the narrow path, both became mingled in a mob which Braddock could not restore to order. Huddled into a 12-foot road, shut in by a forest alive with yells and filled with an invisible foe, they lost all sense or perception, and twice shot down bodies of their own men who had gained slight vantage points, taking their smoke for the enemy's. Fifty Virginians were thus slain at a blow. The regulars refused to charge, though Braddock, with four horses successively shot under him, and the other officers strove to hearten them to invade the wood; the provincials sought to fight Indian fashion behind trees and logs, but Braddock with furious threats and blows drove them back into rank again, where they fell in scores. Washington and Halket begged to have them allowed to leave the ranks, but Braddock still refused. The ammunition began to fail; the baggage was attacked; all Braddock's aides but Washington were shot down; three fourths of the officers, and three fifths of the entire army; and only then would the ill-judging but heroic Braddock give the signal for retreat. Shortly afterward Braddock received a ball through the lungs; not one of the English soldiery would stay to carry him off the field, but one English and two American officers took him from the field to a spot half a mile across the river. Here the dying hero tried to establish a camp for a rallying place, and to care for the wounded and wait for Washington's return from Dunbar; but although the French and Indians had not followed them across, the 100 English soldiers he had induced to stop there stole away again and fled. The officers with their commander marched on till 10 p.m. on the 10th, when they halted and met the convoy from Dunbar, Braddock never ceasing to give calm, skilful, and humane orders; on the 11th he reached

BRADDON — BRADFORD

Dunbar's camp, where the news of the rout had set his soldiers also deserting and fleeing in wild panic. Giving up all hope of the expedition in any hands now, he had the stores destroyed to keep them from the enemy, save enough for a flying march; and the remnant of the army proceeded toward Great Meadows, where Braddock expired, leaving his favorite horse and body servant to Washington. Of 1,460 men in the battle, 456 were killed and 421 wounded; 63 out of 89 commissioned officers were killed or injured, and every field officer. The enemy's casualties were about 60. The entire borders were left defenseless and desolated by a fearful Indian war.

Brad'don, Mary Elizabeth (Mrs. MAXWELL), English novelist: b. London, 1837, daughter of a solicitor there. She received her education at home, and early showed signs of literary power. After publishing some poems and tales, in 1862 she brought out 'Lady Audley's Secret,' which was almost instantly popular and the first of a long series of clever sensational novels, among which may be mentioned 'Aurora Floyd' (1862); 'John Marchmont's Legacy' (1863); 'Eleanor's Victory' (1863); 'Henry Dunbar' (1864); 'Dead Sea Fruit' (1869); 'Dead Men's Shoes'; 'Rupert Godwin' (1869); 'Hostages to Fortune' (1875); 'Ishmael' (1884); 'The Fatal Three' (1888); 'The Venetians' (1892); 'Thou Art the Man' (1894); 'Sons of Fire' (1895); 'London Pride' (1896); 'Under Love's Rule' (1897); 'In High Places' (1898); 'Rough Justice' (1898); 'His Darling Son' (1899); 'The Infidel' (1900); 'The Conflict' (1903). She conducted the London magazine 'Belgravia' for some time, and some of her stories first appeared there. Her later works do not rely so much on sensational effects for their success as her earlier ones. In all she has published over 60 novels. She is the widow of John Maxwell, a well-known publisher.

Brad'ford, Alden, American historian and journalist: b. Duxbury, Mass., 19 Nov. 1765; d. Boston, 26 Oct. 1843. Originally a Congregational minister he became secretary of State of Massachusetts (1812-24), and editor of the *Boston Gazette* (1826). He wrote 'History of Massachusetts, 1764-1820'; 'History of the Federal Government'; 'Life of Jonathan Mayhew' (1838); 'New England Chronology' (1843).

Bradford, Amory Howe, American clergyman and author: b. Granby, Oswego County, N. Y., 14 April 1846. He was graduated at Hamilton College 1867, Andover Theological Seminary 1870; studied at Oxford University, England, and became pastor of the First Congregational Church, Montclair, N. J., in the year last named. He has written: 'Spirit and Life' (1888); 'Old Wine, New Bottles' (1892); 'The Pilgrim in Old England' (1893); 'Hereditry and Christian Problems' (1895); 'The Growing Revelation' (1897); 'Art of Living Alone' (1899); 'The Return to Christ' (1900); 'Age of Faith' (1900); 'Spiritual Lessons From the Brownings' (1900); 'Ascent of the Soul' (1902).

Bradford, Andrew, American printer, son of William Bradford (1663-1752) (q.v.): b. Philadelphia about 1686; d. 23 Nov. 1742. He was the only printer in Pennsylvania from 1712 to 1723. He published the first newspaper in Philadelphia, 22 Dec. 1719, called the *American*

Weekly Mercury. It was by him that Benjamin Franklin was first employed, on his arrival in Philadelphia in 1723. In 1732 he was postmaster; in 1735 he kept a book store at the sign of the Bible in Second Street. In 1738 he removed to No. 8 South Front Street, to a house which in 1810 was occupied as a printing house by his descendant, Thomas Bradford, publisher of the 'True American.'

Bradford, Gamaliel, American writer and politician: b. Boston, Mass., 15 Jan. 1831. He has been prominent in politics as an independent, being a strong opponent of the Philippine policy of the administration, and is the author of 'Lesson of Popular Government' (1898); 'Types of American Character.'

Bradford, John, Protestant martyr and theologian: b. Manchester about 1510; d. Smithfield, London, 1 July 1555. He obtained a situation in the commissariat, and having been guilty of some defalcation, known only to himself, was so impressed by a sermon of Latimer on restitution, that he determined not only to sell everything he had in order to make up the defalcation, but to renounce an employment which exposed him to dangerous temptations. He afterward studied at Cambridge, where he received the degree of M.A., and on taking orders was appointed chaplain to the Bishop of London, and Canon of St. Paul's. From this time he devoted himself to the duties of his office with so much zeal and success that he became one of the most popular preachers of his day. In 1552 he was appointed chaplain to Edward VI., but under the reign of Queen Mary became a marked man. On the charge of preaching sedition he was committed to the Tower (occupying the same room with Ridley, Cranmer, and Latimer), and being brought to trial, was condemned to death as an obstinate heretic. His life is said to have been offered to him if he would only promise to refrain from preaching, but even this he had the manliness to refuse, and he was burned at the stake. A complete edition of his works, which include sermons, meditations, various treatises, etc., was published 1848-53.

Bradford, Joseph, American journalist and dramatic author: b. near Nashville, Tenn., 24 Oct. 1843; d. Boston, Mass., 13 April 1886. His real name was WILLIAM RANDOLPH HUNTER. Besides satirical verses he wrote a number of poems which were highly esteemed, especially those on the death of Victor Hugo and of Gen. Grant. His plays, 'Our Bachelors,' and 'One of the Finest,' were very successful and are still popular.

Bradford, Royal Bird, American naval officer: b. Turner, Me., 22 July 1844. He was graduated at the United States Naval Academy in 1865 and received promotion through various grades to the rank of commander. He has made a specialty of equipment, and since 1897 has been chief of the Bureau of Equipment at the Navy Department in Washington.

Bradford, William, American colonial governor and author: b. Austerfield, Yorkshire, England, 1590; d. Plymouth, 9 May 1657. He was one of the signers of the celebrated compact on the Mayflower; and, in 1621, on the death of the first governor, John Carver, was elected to the same office, which he continued to fill (with the exception of a brief

BRADFORD

period when he declined re-election) until his death. His administration was remarkably efficient and successful, especially in dealing with the Indians. One of his first acts was to adopt measures to confirm the league with the Indian sachem Massasoit. In the beginning of 1622, when the colony was subjected to a distressing famine, a threatening message was received from the sachem of Narragansett in the form of a bundle of arrows bound with the skin of a serpent. The governor sent back the skin filled with powder and ball. This decisive reply finished the correspondence. The Narragansetts were so terrified, that they returned the skin without even inspecting its contents. In return for his kindness and attentions to Massasoit in a dangerous illness, the sachem disclosed to the colony a dangerous conspiracy among the Indians, and it was suppressed. His 'Diary of Occurrences,' covering the first year of the colony, was published in 1622. He left a number of religious compositions in verse; and historical prose writings of great value, the most important being his 'History of the Plymouth Plantation' from the formation of the society in England, in 1602, down to 1647. This disappeared during the American Revolution, but was found in the library of Fulham Palace, England in 1858, and in 1898 was returned to the United States and placed among the archives of Massachusetts. The shorter writings of Bradford will be found in Young's 'Chronicles of the Pilgrims' (1841). See Cotton Mather, 'Magnolia' for life of Bradford; also Tyler, 'History of American Literature' (1898); Walker, 'Ten New England Leaders' (1901).

Bradford, William, the first printer in Pennsylvania: b. Leicester, England, 20 May 1663; d. New York, 23 May 1752. Being a Quaker, he emigrated in 1682 or 1683, and landed where Philadelphia was afterward built, before a house was begun. In 1687 he printed an almanac. The writings of George Keith, which he printed, having caused a quarrel among the Quakers, he was arrested in 1692 and imprisoned for libel. On his trial, when the justice charged the jury to find only the fact as to the printing, Bradford maintained that they were to find also whether the paper was really seditious, and that "the jury are judges in law as well as the matter of fact." He was not convicted, but having incurred the displeasure of the dominant party in Philadelphia, he removed to New York in 1693. In that year he printed the laws of the colony. On 16 Oct. 1725, he began the first newspaper in New York, called the *New York Gazette*. In 1728 he established a paper mill at Elizabethtown, N. J. Being temperate and active, he reached a great age without sickness, and walked about on the very day of his death. For more than 50 years he was printer to the government of New York, and for 30 years the only one in the province.

Bradford, William, American jurist, attorney-general of the United States: b. Philadelphia, 14 Sept. 1755; d. 23 Aug. 1795. He was graduated at Princeton College in 1772, and commenced the study of the law. In the spring of 1776, upon the breaking out of the war with Great Britain, he joined the militia, in which he attained the rank of lieutenant-colonel. In consequence of ill-health he was obliged to

resign at the end of two years, and was admitted to the bar in Philadelphia in 1779. In 1780 he was appointed attorney-general of Pennsylvania. Under the new Constitution he was appointed a judge of the supreme court 22 Aug. 1791. Upon the promotion of Edmund Randolph to the office of secretary of state he received from Washington the appointment of attorney-general of the United States 28 Jan. 1794. In early life he wrote some pastoral poems in imitation of Shenstone; but his principal production was an 'Inquiry how far the Punishment of Death is necessary in Pennsylvania.'

Bradford, William, American painter: b. New Bedford, Mass., 1827; d. New York, 25 April 1892. He entered business early in life, but abandoned it for art. His subjects were the ice fields of the North Atlantic, and well known works of his include 'Steamer Panther in Melville Bay under the Light of the Midnight Sun'; 'Crushed by Icebergs'; 'Arctic Wreckers'; 'Land of the Midnight Sun'; and 'Sunset in the North.'

Bradford, English manufacturing city, in the West Riding of Yorkshire, eight miles west of Leeds. It is pleasantly situated on a feeder of the Aire, at the junction of three extensive valleys, and consists of an ancient and a more modern portion, the latter with spacious, well-built streets. The appearance of the town has been almost completely changed since 1861, the corporation having, at a great expenditure of money, effected most extensive street improvements, widening the principal thoroughfares, improving the gradients, and opening up new streets. Spacious covered markets have been erected at a great cost. Among the public buildings are the town-hall (1873), in French Gothic style; St. George's Hall, erected in 1851, and capable of accommodating about 5,000 persons; an exchange, containing a statue of Cobden; a temperance hall; a mechanics' hall, with lecture rooms and library; a technical college, opened in 1882; free library (1872). The schools include the free grammar-school, endowed by Charles II., the girls' grammar-school, and the board schools. In Airedale College young men are trained for the ministry among the Independents. Among the charitable institutions may be noticed the infirmary, the eye and ear hospital, the children's hospital, St. Catharine's Home, an institution for the blind, and alms-houses. There is a fever hospital, to which patients are admitted at moderate charges, and when persons are too poor to pay, the corporation bears the cost. There is also a small-pox hospital. Bradford has several public parks, some of them finely laid out, besides Baildon Moor (600 acres) reserved for recreation purposes. There is an extensive system of water-works by gravitation, and water, gas, and electric supply undertakings are owned by the municipality. The worsted yarn and stuff trade is the principal industry; there are also alpaca and mohair manufactures (with which Sir Titus Salt's name is connected), manufactures of silk and velvet (the Manningham Mills of Lister & Company), mixed cotton and silk goods; and some cotton factories. In the neighborhood are quarries and iron-works. The town was incorporated in 1847, and its affairs are managed by a mayor, 21 aldermen, and 63 councillors. It was accorded the rank of a city in

BRADFORD — BRADLEY

1897. The three parliamentary divisions of Central, East, and West Bradford each send one member to Parliament. A United States consulate is established here. Pop. about 294,000.

Bradford, Pa., a city in McKean County, on several railroads; 15 miles northwest of Smethport, the county-seat. It is in an extensive coal, oil, and natural gas region, and is principally engaged in industries connected therewith, besides having machinery, chemical, boiler, and brick and tile works. The city has electric street railroads, daily and weekly newspapers, three national banks, large hospital, several libraries, and is lighted and heated by natural gas. Pop. (1910) 14,544.

Bradford-on-Avon, an ancient market-town of England, in Wiltshire, beautifully situated 28 miles northwest of Salisbury, on both banks of the Lower Avon, here crossed by two bridges—a very old one of nine arches in the centre of the town, and a modern one, Barton Bridge, of four. The town chiefly consists of three regular streets, containing many handsome houses. There is a good parish church of the Holy Trinity, in the Norman and subsequent styles; a town-hall, in Elizabethan style; and some interesting old buildings. Among the latter is the small but unique church of St. Laurence, the only complete specimen of Anglo-Saxon architecture still existing, and of great archæological interest. It was built in the 8th century by Saint Aldhelm, and consists of a chancel, a nave, and a porch on the north side. Woolen cloth is manufactured, but this industry has declined. Bradford was of some note in Anglo-Saxon times, St. Dunstan having been elected Bishop of Worcester at a synod held in it. Pop. about 5,000. See Perkins, 'Abbey Churches of Bath, Malmesbury, and St. Laurence' (1901).

Bradlaugh, Charles, English secularist: b. London, 28 Sept. 1833; d. 30 Jan. 1891. He made himself known by his writings and lectures, and more especially by his efforts to gain admission to Parliament. Being elected for Northampton in 1880, he claimed the right to make affirmation simply, instead of taking the oath which members of Parliament take before they can sit and vote, but being a professed atheist this right was denied him. Though repeatedly re-elected by the same constituency, the majority of the House of Commons continued to declare him disqualified for taking the oath or affirming; and it was only after the election of a new Parliament in 1885 that he was allowed to take his seat without opposition as a representative of Northampton. He was editor of the 'National Reformer.' Not long before his death Parliament erased from its records its resolution prohibiting him from taking the oaths. See the 'Life' (1894) by his daughter and J. M. Robertson.

Bradlee, Nathaniel, American architect: b. Boston, 1829; d. 1888; began the study of architecture in 1846. He achieved marked success, having been the architect of over 500 prominent buildings in the city of Boston. In 1869 he made a national reputation by moving bodily the large brick structure known as the Hotel Pelham to the corner of Tremont and Boylston streets. The work attracted wide attention,

both in this country and in Europe. He subsequently superintended the removal of the Boylston Market.

Bradley, Arthur Granville, English author, son of George Granville Bradley (q.v.): b. 11 Nov. 1850. He was educated at Marlborough and Trinity College, Cambridge, and has published 'History of Marlborough College' (1893); 'Life of Wolfe' (1895); 'Sketches from Old Virginia' (1897); 'Highways and Byways of North Wales' (1898); 'The Fight with France for North America' (1900); 'Highways and Byways of the English Lake District' (1901); 'Owen Glyndwyr' (1901).

Bradley, Edward (CUTHBERT BEDE), English author and clergyman: b. Kidderminster, 1827; d. Lenton, 12 Dec. 1889. He was graduated at Durham University, and was rector of Denton, Stretton, and finally Lenton from 1883 until his death. He contributed to 'Punch' and other London periodicals, and published the 'Adventures of Mr. Verdant Green, an Oxford Freshman' (London 1855), a humorous picture of college life. His other works include 'Mr. Verdant Green Married and Done For' (1856); 'The White Wife,' a collection of Scottish legends (1864); 'Little Mr. Bouncer and His Friend, Verdant Green' (1873-4); and several books of travels.

Bradley, George Granville, English clergyman, dean of Westminster Abbey, 1881-1902: b. 11 Dec. 1821; d. London, 12 March 1903. He was educated at Rugby and University College, Oxford, and took orders in the Anglican Church. He was assistant master at Rugby 1846-58; master of Marlborough College 1858-70; master of University College 1870-81. In the last named year he became canon of Worcester and succeeded Dean Stanley as dean of Westminster. He published 'Recollections of Arthur Penryhn Stanley' (1883); 'Lectures on the Book of Job' (1884); 'Lectures on Ecclesiastes' (1885). He resigned the deanery of Westminster a few months before his death.

Bradley, Henry, English scholar and lexicographer: b. Manchester, England, 3 Dec. 1845. He has twice been president of the Philological Society and has been joint editor of the 'Oxford English Dictionary' from 1889. He has published 'The Story of the Goths' (1888); contributed important articles to the 'Dictionary of National Biography'; etc., and edited the E, F, G, and L portions of the 'Oxford Dictionary'.

Bradley, James, English astronomer: b. Sherborne, Gloucestershire, 1693; d. Chalford, Gloucestershire, 13 July 1762. He was educated at Balliol College, Oxford, and took orders, but his taste for astronomy soon led him in a different direction, and in 1721 he was appointed Savilian professor of astronomy at Oxford. Seven years afterward he made known his discovery of the aberration of light. But although this discovery gave a greater degree of accuracy to astronomical observations, yet slight differences remained which he studied during 20 years with the greatest perseverance, and finally discovered that they were fully explained by the supposition of an oscillating motion of the earth's axis, completed during a revolution of the moon's nodes, that is, in about 18 and a half years. He called this phenomenon the "nutaton."

of the earth's axis'; and published his account of it in 1748. By these two discoveries astronomers were, for the first time, enabled to make tables of the motions of the heavenly bodies with the necessary accuracy. Bradley had already, in 1726, explained the method of obtaining the longitude by means of the eclipse of Jupiter's first satellite. In 1742, at the death of Dr. Halley, he received the office of astronomer royal, and removed to the observatory at Greenwich. Here he spent the remainder of his life, entirely devoted to his astronomical studies. His observations in manuscript appeared under the title of 'Astronomical Observations made at the Observatory at Greenwich, 1750-62' (1798, 1805). From this rich mine have been taken thousands of observations, on the sun, moon, and planets, of the highest astronomical value.

Bradley, John Edwin, American educator: b. Lee, Mass. He was graduated from Williams College in 1865, and was successively principal of high schools in Pittsfield, Mass., 1865-8; Albany, N. Y., 1868-86. He was superintendent of schools at Minneapolis 1886-92, and president of Illinois College 1892-1900. He is the author of 'Science and Industry'; 'School Incentives'; 'Healthfulness of Intellectual Pursuits'; 'Work and Play'; 'Talks With Students.'

Bradley, Joseph Philo, American jurist: b. Berne, N. Y., 14 March 1813; d. Washington, D. C., 22 Jan. 1892. He was graduated at Rutgers College in 1836; admitted to the bar in 1839; and became a justice of the United States supreme court in 1870. As a member of the electoral commission he cast the vote which gave the presidency to Gen. Hays, in 1877. He devoted much time to mathematical study.

Bradley, Milton, American manufacturer: b. Vienna, Me., 8 Nov. 1836. He organized the Milton Bradley Company at Springfield, Mass., in 1863, for the manufacture of kindergarten supplies. He has published 'Color in the School Room' (1890); 'Color in the Kindergarten' (1893); 'Elementary Color' (1895); 'Water Colors in the School Room' (1900).

Bradshaw, John, English judge and regicide: b. Cheshire, England, 1602; d. London, 31 Oct. 1659. He studied law at Gray's Inn, and obtained much chamber practice from the partisans of the Parliament, to which he was zealously devoted. When the trial of the king was determined upon, the resolute character of Bradshaw pointed him out for president, which office, after a slight hesitation, he accepted. His deportment on the trial some describe as lofty and unbending, others as harsh and overbearing. He was subsequently appointed permanent president of the council of state, and received other honors. He rendered himself obnoxious to Cromwell, when the latter seized the protectorate, and was deprived of the chief-justiceship of Chester. On the death of Cromwell in 1658, and the restoration of the Long Parliament, he obtained a seat in the council, and was elected president. He died in 1659, and on his death-bed asserted that, if the king were to be tried and condemned again, he would be the first to agree to it. He was magnificently buried in Westminster Abbey, from which his body was ejected and hanged on a gibbet at Tyburn, with those of Cromwell and Ireton, at the Restoration.

Bradshaw's Railway Guide, a well-known English manual for travelers, first issued by George Bradshaw, a printer and engraver of Manchester, in 1839. It is now published on the first of each month, and contains the latest arrangements of railway and steamboat companies, beside other useful information. There are now many such hand-books in the field, and the idea has since been further developed in the descriptive hand-books of Murray, Baedeker, and others.

Bradstreet, Anne, American poet: b. Northampton (probably), England, 1612; d. Andover, Mass., 16 Sept. 1672. She was the daughter of Gov. Thomas Dudley, and married the future governor, Simon Bradstreet, in 1628. She went with him to New England in 1630. She was the first woman of letters in America, her verse being written in the intervals of household cares, and by her contemporaries was styled "The Tenth Muse." Her volume of poems was published in London in 1650. A more complete edition appeared at Boston in 1678, containing, among other additional compositions, her best poem, entitled 'Contemplations.' A third edition was published in 1758. She was the mother of eight children, to whom she makes the following allusion:

I had eight birds hatch't in the nest;
Four cocks there were, and hens the rest;
I nurs'd them up with pains and care,
For cost nor labor did I spare;
Till at last they felt their wing,
Mounted the trees and learned to sing.

Her complete works, edited by J. H. Ellis, were reprinted in Boston in 1867, and again in 1897. See Tyler, 'American Literature' (1898).

Bradstreet, John, English soldier in America: b. 1711; d. New York, 21 Oct. 1774. He was, in 1746, lieutenant-governor of St. Johns, Newfoundland. In 1756, when it was considered highly important to keep open the communication with Fort Oswego, on Lake Ontario, he was placed at the head of 40 companies of boatmen, raised for the purpose of supplying it with stores from Schenectady. On his return, 3 July 1756, with 300 of his force he was attacked from an ambuscade, on the Onondaga River, but repulsed and routed the enemy with great loss. In 1758 he commanded a force of 3,000 men in the expedition against Fort Frontenac, which was surrendered 27 August, with all its military stores, provisions, and merchandise, on the second day after he commenced the attack. In 1764 he advanced with a considerable party toward the Indian country, and made a treaty of peace with the various tribes at Presque Isle. He was appointed major-general in 1772.

Bradstreet, Simon, American colonial governor: b. Horbling, Lincolnshire, England, March 1603; d. Salem, Mass., 27 March 1697. Left an orphan at the age of 14, he was brought up under the care of Thomas Dudley (q.v.), whose daughter Anne he married. For a time he was steward to the Earl of Lincoln, and later to the Countess of Warwick. He, with Dudley and Winthrop, determined to emigrate and form a settlement in Massachusetts. Embarking with his wife on the Arbella, 29 March 1630, they anchored off Salem on 12 June. In 1631 Bradstreet was one of those who

commenced building at Newtown, now Cambridge, and he resided there for several years. In 1639 he was granted 500 acres of land at Salem. He was also one of the first settlers of Andover, building in 1644 the first mill on the Cochichewick. After the death of his wife in 1672, he seems to have spent his time mainly in Boston and Salem. He was the colony's first secretary, one of the first commissioners of the United Colonies in 1643, and in 1653 vigorously opposed making war on the Dutch in New York, and on the Indians; and it was prevented by his steady and conscientious opposition and the decision of the general court of Massachusetts. He was deputy-governor from 1672 until his election as governor in 1679, in which office he continued until 1686. When Charles II. demanded the colony's charter, Bradstreet thought it better that it should be surrendered than that it should be taken away by judgment. He opposed the arbitrary proceedings of Andros, and when, in 1689, the people put down his authority, they made their former governor their president, and he continued as the head of the administration till May 1692, when Gov. William Phipps arrived, bringing the new charter, in which Bradstreet was named as first assistant. For 62 years he had been in the service of the colony, and he lived to be the "Nestor of New England," for all who came over from England with him, died before him. He was a popular magistrate and official, a man of integrity and piety, and one of the few who stoutly opposed the witchcraft delusion of 1692. See *New England Historical and Genealogical Register*, Vol. I., pp. 75-6, and Vol. VIII., p. 325, for a reprint of his 'Journal, 1664-83.'

Bradwardine, brād'wēr-dīn, or **Bredwardine**, Thomas (DOCTOR PROFUNDUS), English scholar: b. Hartfield, Sussex, about 1290; d. 1349. He was distinguished for his varied learning, and more particularly for his treatise, 'De Causa Dei Contra Pelagium,' an extensive work against the Pelagian heresy, for centuries a standard authority. He was chaplain and confessor to Edward III., whom he accompanied to France, being present at Cressy and the capture of Calais. Being appointed archbishop of Canterbury, he hastened to England, but died of the black death on reaching London. Other works by him are: 'De Geometria Speculativa'; 'De Proportionibus'; 'De Quadratura Circuli'; 'De Arithmetica Practica.'

Bradwardine, Baron, a character in Scott's novel of 'Waverley.' He is represented as a rather opinionated retired soldier, living at his seat of Tully Vedlan.

Brady, Anthony Nicholas, American capitalist: b. of Irish parentage, Lille, France, 22 Aug. 1843. He came as an infant with his parents to the United States, and at the age of 13 began to make his own way in life. After engaging successfully in the tea business in Albany, and in that of granite quarrying, he became financially interested in gas companies, railway companies and the like, successfully developing the street railway system of New York and amassing a fortune of many millions. He has also been connected with oil and electric lighting interests.

Brady, Cyrus Townsend, American Episcopal clergyman and author: b. Allegheny, Pa., 20 Dec. 1861. He graduated from the United States Naval Academy, 1883, but resigned, studied theology under Bishop Worthington of Nebraska, and was ordained in 1890. For five years he served as a missionary in Colorado, Missouri, and Kansas; was archdeacon of Pennsylvania, 1895-9, and rector at Overbrook, Philadelphia, from 1899 until his resignation to devote himself exclusively to writing, in which he has attained popularity as a writer of stories and novels of adventure, romance, and history. He has written: 'For Love of Country' (1898); 'For the Freedom of the Sea' (1899); 'Stephen Decatur' (1900); 'Recollections of a Missionary in the Great West' (1900); 'American Fights and Fighters' (1900); 'Commodore Paul Jones' (1900); 'When Blades are Out and Love's Afeld' (1901); 'Under Tops'ls and Tents' (1901); 'An Apostle of the Plains' (1901); 'Colonial Fights and Fighters' (1901); 'Under the Ban of the Red Beard' (1901); 'Border Fights and Fighters' (1902); 'Hohenzollern' (1902); 'In the Wasp's Nest' (1902); 'Quiberon Touch' (1901-2); 'Woven With the Ship' (1902); 'The Bishop' (1903); 'Conquest of the Southwest' (1903); 'The Southerners' (1903).

Brady, Henry Bowman, English paleontologist: b. Gateshead, England, 1835; d. 1890. He was prominent as a manufacturing pharmacist and his success in business enabled him to devote much time to scientific research, becoming in time the highest English authority regarding foraminifera. He was the author of several monographs on Mesozoic, Cenozoic, and other foraminifera, and of the more important works: 'Report on the Foraminifera Dredged by H. M. S. Challenger, During the Years 1873-6,' and 'Scientific Results of the Challenger Voyage,' Vol. IX. (1888).

Brady, Hugh, American general: b. Northumberland County, Pa., 1768; d. Detroit, 15 April 1851. He entered the United States army as an ensign, 7 March 1792; served with Wayne in his western expedition, after the defeat of St. Clair; was made lieutenant in 1794, and captain in 1799. Having left the military service, he was restored to it in 1808, by President Jefferson, who then began to reform the army. 6 June 1812 he was appointed colonel of the 22d foot, and led his troops in the hard-fought battle of Chippewa. They were almost annihilated, but displayed the greatest courage, Gen. Scott saying in his report, "Old Brady showed himself in a sheet of fire." He displayed equal courage at the battle of Niagara Falls, where he was wounded. He was retained in service, on the reduction of the army, as colonel of the 2d foot, a commission he held until his death. After 1835 he was in command of the department of which Detroit was the headquarters; and while at that place contributed, in no small degree, to the pacification of the frontier, during the Canadian troubles. He was looked on by the army as one of its fathers. He received two brevets, as brigadier-general, 6 July 1822, and as major-general, for long and faithful service, 30 May 1848. Immediately before his death, the chaplain of his corps visited him and sought to speak to him of religious matters. Gen. Brady listened to him,

and said, "Sir, that is all right; my knapsack, however, has been packed, and I am ready to march at the tuck of the drum."

Brady, James Topham, American lawyer: b. New York, 9 April 1815; d. there, 9 Feb. 1869. He was educated by his father, an eminent jurist, and admitted to the bar in 1836. His eloquence, skill, and ability at once brought him reputation and a fine practice. Conspicuous for his knowledge in all departments of law, he won verdicts from judges and jurors alike in important patent cases, such as *Goodyear v. Day*; cases involving questions of medical jurisprudence, like the *Allaire and Parish* will cases, the *Huntington forgery* case, and *Cole homicide* case; divorce cases, like that of *Mrs. Edwin Forrest*, and civil actions of all kinds. He was at his best in criminal cases, where he usually appeared on the side of the defense. At one time he defended successfully in a single week four clients charged with murder. In 1859 he was counsel for *Daniel E. Sickles* in his trial for the assassination of *Philip Barton Key*, his opening address for the defense being one of his most notable forensic efforts. Though a States-rights advocate before the War, he supported Lincoln's war measures, making speeches which had considerable influence.

Brady, John, Irish-American ecclesiastic: b. County Cavan, Ireland, 1842; d. Boston, 6 Jan. 1910. He prepared for the priesthood at All Hallows College in Ireland, was assistant priest in Newburyport, Mass., 1864-8, and afterwards pastor of St. Joseph's Church at Amesbury, Mass. In 1891 he was consecrated auxiliary bishop of Boston and titular bishop of Boston.

Brady, Nicolas, English prelate: b. Bandon, Ireland, 28 Oct. 1659; d. Richmond, Surrey, 20 May 1726. He was educated at Westminster School, and afterward received the degree of B.A. both at Oxford and at Dublin, and took orders in the Irish Church. Having come to England he obtained several ecclesiastical preferments; among others the rectory of the Church of St. Catharine Cree, London, and that of Richmond, Surrey. This put him in possession of an income which might, but does not seem to have sufficed for his wants, as he thought it necessary to increase it by keeping a school at Richmond. His largest work, a translation of the *Æneid*, was an absolute failure, but he has made his name a kind of household word, at least in England, by executing, in concert with *Nahum Tate*, the 'New Versions of the Psalms of David' (1695), which soon came to be commonly used in the Episcopal Church.

Brady, William Maziere, Irish theologian: b. Dublin, 1825. He was for a long period a clergyman in the Established Church of Ireland, but was prominent in the agitation leading to its disestablishment in 1869, and lost several of his preferments by that event. In 1873 he entered the Roman Catholic Church. He has published 'The Episcopal Succession in England, Ireland, and Scotland, 1400-1875' (1876-7); 'Annals of the Catholic Hierarchy in England and Scotland' (1883); 'Anglo-Roman Papers' (1890).

Brady-car'dia, an abnormally slow heart. Brady-cardia occasionally is a family trait, and is then normal. Napoleon is said to have had a heart beat of only 40 to the minute. It may occur during pregnancy, and is often present in the convalescence of fevers, particularly typhoid, acute rheumatism, diphtheria, and pneumonia. It sometimes accompanies disease of the digestive tract; is often present in emphysema, and further present rarely in a number of conditions. Among these may be mentioned fibroid changes in the heart, nephritis, lead, alcohol, tobacco, and digitalis poisoning, in melancholia, general paresis, and in apoplexy. It may mean much or may be insignificant, and its importance is largely measured by its causative factors.

Braekeleer, Ferdinandus dé, fér-dē-nān'doos dé brā'kē-lār, Belgian artist: b. Antwerp, 1792; d. 1883. He was a member of the Antwerp Academy and a director of the Antwerp Museum, and as an instructor was especially successful. Among his works are 'Tobit Burying a Jew by Night' (1817); 'The Baker'; 'Bombardment of Antwerp in 1830'; 'Happy Family'; 'Unhappy Family.'

Braemar, brā-mār', Scotland, a mountainous district in the southwest corner of Aberdeenshire. It contains part of the Grampian range, with the heights of Ben Macdhui, Cairntoul, Lochnagar, etc. The district has some fine scenery, valleys, and hillsides covered with birch and fir, but consists largely of deer-forests. The Balmoral Castle, formerly the residence of the late Queen Victoria, is situated here, on the banks of the Dee, midway between Ballater and Braemar village (Castleton of Braemar).

Brag, a game of cards, played with a full-pack. It is so named because each player endeavors to impose upon his neighbor, by "bragging" about his hand, in an endeavor to make his opponents believe it more valuable than it is. The cards rank as in whist, except the nines and knaves, which take their value from the cards with which they are held. Thus an ace, a nine, and a knave are equivalent to three aces. The hands are shown, not played, the strongest one taking the stakes.

Braga, Theophilo, Portuguese philologist and critic: b. San Miguel, Azores, 24 Feb. 1843. He was educated at the university of Coimbra, and became professor of literature in the Curso Superior de Letras in Lisbon. He is a very voluminous writer and takes important rank as a historian of the literature of the Iberian peninsula. He is also noted as an exponent of the Comtian philosophy. In politics he has been prominent as an active democrat, and became the first President of the Republic of Portugal, 5 Oct. 1910. Among his works may be mentioned: 'Stella Matutina' (1863); 'Tempestades Sonoras' (1864); 'Torrentes' (1868), and a collection entitled 'Alma Portuguesa' (1893). Of his other works may be noted: 'Historia da Litteratura Portuguesa' (1870-81); 'Manual da Litteratura Portuguesa' (1875); 'Parnaso Portuguez Moderno' (1877); a volume on *Camões* (1880); 'Traços Geraes de Philosophia Positiva' (1877); 'Contos Tradicionaes do Povo Portuguez' (1883); 'Systema de Sociologia' (1884); 'Historia da Universidade de Coimbra' (1892).

BRAGA — BRAHE

Braga, brá'gā, Portugal, a town in the province of Minho, and its capital, situated on a rising ground between the Cavado and D'Este, about 32 miles north-northeast of Oporto. It is surrounded by walls flanked with towers and defended by a castle. The houses are old, the streets broad, but not well laid out. It is the seat of an archbishop who is primate of Portugal, and contains an archiepiscopal palace, a richly ornamented Gothic cathedral of the 13th century, parish churches, monasteries, a college, etc. The manufactures are of some importance. Braga is supposed to have been founded by the Carthaginians, and there exist remains of a Roman temple, amphitheatre, and aqueduct. On a hill some distance east of the town stands the famous pilgrimage church of Bom Jesus do Monte.

Bragança, brá-gān'sā, the name of two considerable towns in Brazil: (1) A seaport, 100 miles northeast of Para, at the mouth of the Caíte, which is here navigable to the town. Pop. of town and district, 6,000. (2) An inland city of about 10,000 inhabitants, 50 miles north-east of Sao Paulo.

Bragança, or **Braganza**, Portugal, the capital of a district (of the same name) in the province of Tras-os-Montes. It was in former times the capital of the province, and is a place of considerable importance. It has the ruins of an ancient castle, one of the finest feudal remains in Portugal. It is the see of a bishop, and there is an extensive manufactory of velveteens, printed calicoes, and woolens. Bragança has given its name to the present royal family of Portugal. Pop. about 5,500.

Bragança, or **Braganza**, House of, the present reigning house of Portugal, derived from Affonso, Duke of Bragança, a natural son of João I., king of Portugal. The constitution of Lamego, 1139, declares that no foreign prince can succeed to the throne; consequently in 1578, on the death of the Portuguese hero Sebastian, in Africa, without issue, his people had recourse to the illegitimate line of Bragança. Philip II. of Spain, however, claimed the throne, and supported his pretensions by an army under the Duke of Alva, who, though in disgrace, was summoned from his retreat for this express purpose. In 1668 the Portuguese shook off the Spanish yoke. In 1801 Napoleon I. declared that the line of the Bragança sovereigns had ceased. John, regent of the kingdom, withdrew to Brazil in 1807, but returned in 1821. At his death in 1826 his son, Don Pedro, resigned the throne in favor of his daughter, Maria da Gloria, preferring to remain emperor of Brazil, to which office he had been elected by the Brazilians, 18 Nov. 1825.

Bragg, **Braxton**, American military officer: b. Warren County, N. C., 22 March 1817; d. Galveston, Tex., 27 Sept. 1876. He graduated at West Point in 1837; was appointed second lieutenant in the 3d Artillery; served with distinction under Gen. Taylor in the Mexican war; and retired to private life in 1856. At the outbreak of the Civil War he became a brigadier-general in the Confederate army, and was stationed at Pensacola to act against Fort Pickens. In 1862, having been appointed a general of division, with orders to act under Gen. A. S. Johnston, commanding the army of the Mississippi, he took an important part in the two

days' battle of Shiloh. On Johnston's death he was appointed to his command, with the full rank of general, and succeeded Gen. Beauregard as commander of the department in July of the same year. The last command he resigned in December 1863. His chief success was at Chickamauga in September 1863, when he inflicted a defeat on the army of Gen. Rosecrans, but was himself, in turn, defeated by Gen. Grant, which led to his temporary removal from command in January 1864, and he was appointed military adviser to Jefferson Davis. In 1864 he assumed command of the department of North Carolina. After the war he was chief engineer of the State of Alabama, and superintendent of the improvements in Mobile Bay.

Bragg, **Edward Stuyvesant**, American legislator: b. Unadilla, N. Y., 20 Feb. 1827; d. 20 June 1912. He was educated at Geneva (Hobart) College, and admitted to the New York bar, 1848. Removed to Fond du Lac, Wis., and was admitted to the Wisconsin bar, 1850, to that of Illinois, 1869, and to that of the United States supreme court, 1877. He served in the Union army during the Civil War, and won his way to the rank of brigadier-general. He was a member of the Union convention at Philadelphia in 1866; representative in Congress in 1877-85; and a delegate to the Democratic National Conventions of 1872, 1884, 1892, and 1896. In the convention of 1884 he seconded the renomination of Grover Cleveland, when he uttered the memorable phrase, "We love him for the enemies he has made." In 1888 he was appointed minister to Mexico; from 15 May to 15 Sept. 1902, was consul-general in Havana and since 15 Sept. 1902 at Hong Kong.

Bragi, brá'jē, the Scandinavian god of poetry. He is represented as an old man with a long flowing beard, like Odin; yet with a serene and unwrinkled brow. His wife was Idunna.

Braham, brá'am, **John**, English tenor singer: b. London (of Jewish extraction), 1774; d. 1856. He made his first appearance as a vocalist at the age of 10. On attaining manhood he proceeded to France and Italy with the view of improving himself in his art, and accomplished this so successfully that on his return after an absence of several years he soon rose to the position of the first English singer of his day. He sung much in opera, but gained his greatest triumphs in national songs, such as 'The Bay of Biscay, O', and 'The Death of Nelson,' and till within a few years of his death he continued to appear in public. His sons, Charles, Augustus, and Hamilton, also adopted the musical profession.

Brahe, **Tycho**, tī'kō brā, or brā, Swedish astronomer: b. Knudstrup, near Lund, 14 Dec. 1546; d. Prague, Bohemia, 24 Oct. 1601. The district where he was born was then a province of Denmark, but the family was of Swedish origin. He was sent at the age of 13 to the University of Copenhagen with the intention that he should be educated for government service. He evinced great promise as a Latin scholar, but an eclipse of the sun turned his attention to astronomy. His uncle sent him later to Leipsic to study law, but Brahe, while his tutor slept, busied himself nightly with the stars. He succeeded, as early as 1563, in detecting grave errors in the Alphonsine tables and

the so-called Prutenic (that is, Prussian) tables, and set about their correction. The death of an uncle, who left him an estate, recalled him to his native place in 1565; but he very soon became disgusted with the ignorance and arrogance of those moving in the same sphere with himself, and went back to Germany. At Wittenberg, where he resided for a short time, he lost part of his nose in a duel with a Danish gentleman; but for the lost organ he ingeniously contrived one of gold, silver, and wax, which fitted admirably. After two years spent in Augsburg, he returned home, where, in 1572, he discovered a new and brilliant star in the constellation Cassiopeia. In 1573 he married a peasant girl. After some time spent in travel, Brahe received from his sovereign, Frederic II., the offer of the small island of Hven or Hoëne, in the sound, 10 miles from Copenhagen, as the site for an observatory, the king also offering to defray the cost of erection, and of the necessary astronomical instruments, as well as to provide him with a suitable salary. Brahe accepted the proposal, and, in 1576, the castle of Ufanienburg ("fortress of the heavens") was begun. Here, for a period of 20 years, Brahe prosecuted his observations with the most unwearied industry. Here, also, he was visited by astronomers, mathematicians, philosophers, theologians and princes, among the latter being the future James I. of England, who took a lively interest in the astronomer's work. Asking Brahe what gift he should make in return for the other's courtesy, the scholar replied, "Some of your majesty's own verses." So long as his munificent patron, Frederic II., lived, Brahe's position was all that he could have desired, but on his death in 1588 it was greatly changed. Under Christian IV. Brahe was barely tolerated; but in 1597 his situation had grown so unbearable that he left the country altogether, having been the year before deprived of his observatory and emoluments. After residing a short time at Rostock and at Wandsbeck, near Hamburg, he accepted an invitation of the Emperor Rudolf II.—who conferred on him a pension of 3,000 ducats—to Benatek, a few miles from Prague, where a new Uranienburg was to have been erected for him, but he died shortly after. On his deathbed he solemnly confided his system to his celebrated pupil Kepler, then but 28 years old.

Brahihow, Brailow, bră'ê-low, or Braila, bră'ê-lă, Rumania, a town and port on the left bank of the Danube, about 12 miles above Galatz, and over 120 miles from the Sulina mouth of the river. It is accessible by large sea-going vessels, and carries on a great trade in the export of grain, importing coal, agricultural machinery, etc. Both as regards accommodation for shipping and otherwise it has been much improved in recent years. In the Turkish wars of the latter half of the 18th century Brahihow was several times besieged and taken by the Russians. In 1828 it had to surrender to the Russians after a gallant resistance, but in 1829 the Peace of Adrianople restored it to the Turks.

Brahma, the first person in the Triad, or Trimurti, of the Hindus, which consists of **Brahma** the creator; **Vishnu** the preserver or redeemer; and **Siva** the destroyer. He is represented with four heads and as many arms,

holding in his four hands a manuscript book containing a portion of the Vedas, a pot for holding water, a rosary, and a sacrificial spoon. The swan is consecrated to him and in the cave temple of Elephanta he is represented as sitting on a lotus, supported by five swans. He is the god of the fates, master of life and death, and, by some, has been represented as the supreme eternal power; but he is himself created and is merely the agent of **Brahmā** (a neuter noun), the universal power or ground of all existence. He is considered as the author of the Vedas and the lawgiver and teacher of India. The worship of **Brahma** is regarded as the oldest religious observance in that country. In modern Hindu religion, however, it has been practically superseded by the worship of **Vishnu** and **Siva**. The epithets applied to this divinity are very numerous, some of the most usual being **Swayambhu**, the self-existing; **Parameshti**, who abides in the most exalted place; **Pitamaha**, the great father; **Prajāpati**, the lord of creatures; **Lokesa**, the ruler of the world. See **INDIA**; **BRAHMANS**.

Brahmagupta, Hindu astronomer and mathematician: b. probably toward the close of the 6th century A.D. His '**Brahma-sphuta-siddhanta**' (the Improved System of **Brahma**) is said to be an earlier work recast: portions of it have been translated into English.

Brahman Bull, a bull of the humped cattle, or zebu breed, of India and eastward, regarded with veneration by devout Hindus, and safe from molestation, even when turned loose by temple priests to forage upon the market stalls in city streets. Adorned with trappings and garlands of flowers, these pampered bulls figure largely in religious ceremonials and processions. See also **INDIAN HUMPED CATTLE**.

Brahmanas, the ancient theological writings appended to the original four Vedas by the Brahmins, or priests, for the purpose of very greatly magnifying their own office as a caste intrusted with the conduct of sacrifices of every kind. There are some 13 of them, with attachments to different parts of the original four Vedas. The **Satapatha-Brahmana** is the most important and valuable. It is called **Satapatha**, or "of the hundred paths," because it consists of 100 lectures. It has a very minute and full account of sacrificial ceremonies in Vedic times, and many legends and historical allusions. Nothing could be more wearisome reading; yet the information which can be gleaned in regard to sacrifices, the priestly caste, and many features of the social and mental development of India, is very valuable. A devout belief in the efficacy of invocation and sacrifice appears in the Vedic hymns. This was taken advantage of by the Brahmins to arrange a regular use of these hymns in the two liturgical Vedas, and to establish a proper offering of sacrifices conducted by themselves. The **Brahmanas** are their endlessly repeated explanations and dictions about sacrifice and prayer.

The third, fourth, and fifth books of the great work presented in these five volumes deal very particularly with the **Soma-sacrifice**, the most sacred of all the Vedic sacrificial rites. It concerns the nature and use of "a spirituous liquor extracted from a certain plant, described as growing on the mountains." "The potent juice of the **Soma** plant, which endowed the

BRAHMANS—BRAHMO-SOMAJ

feeble mortal with godlike powers and for a time freed him from earthly cares and troubles, seemed a veritable God—bestower of health, long life, and even immortality." The moon was regarded as the celestial Soma, and source of the virtue of the plant. Another branch of the story of sacrifices relates to the worship of Agni, the Fire. It fills 5 out of 14 books, and the ideas reflected in it are very important for knowledge of Brahman theosophy and cosmogony. The ritual of the Fire-altar was brought into close connection with that of the Soma "fiery" liquor.

Brahmans, the first of the four castes of the Hindus. They proceeded from the mouth of Brahma, the seat of wisdom. They form the sacred or sacerdotal caste, whose members have maintained perhaps a more absolute and extensive authority than the priests of any other nation. Their great prerogative is that of being the sole depositaries and interpreters of the Vedas, or sacred books. There are seven subdivisions of the Brahmans, which derive their origin from seven penitents, personages of high antiquity and remarkable purity, who are said to have rebuked the gods themselves for their debaucheries. The great body of the Brahmans pay equal veneration to the three parts of the mysterious trinity, but some attach themselves more particularly to one person of the triple godhead. Thus the Vishnuvites are distinguished by an orange-colored dress, and the mark called *nama* on their foreheads. The devotees of Siva wear the *lingam*, and are distinguished from the former by their great abstemiousness. A Brahman should pass through four states. The first begins at about seven, when the duty of the young novice, or *Brahmachari*, consists in learning to read and write, studying the Vedas, and becoming familiar with the privileges of his caste, and all matters of personal purity. Thus he is taught his right to ask alms, to be exempted from taxes, from capital and even corporal punishment. Earthen vessels belonging to Brahmans, when used by profane persons, or for certain purposes, must be broken. Leather and skins of animals, and most animals themselves, are impure, and must not be touched by them. Flesh and eggs they are not allowed to eat. The Brahman is also taught to entertain a horror of the defilement of the soul by sin; and rules for purification by ablution, penances, and various ceremonies, are prescribed. The second state begins at his marriage, when he is called *Grihastha*. Marriage is necessary to his respectability. His daily duties become more numerous, and must be more strictly performed. Regular ablutions, fasting, and many minute observances, become requisite. The Brahmans, however, engage in secular employments, political, commercial, etc. The third state is that of the *Vana-Prasthas*, or inhabitants of the forest, which is now, however, seldom reached. They were honored by kings, and respected even by the gods. Retiring to the forest, green herbs, roots, and fruit were their food: reading the Vedas, bathing morning, noon, and evening, and the practice of the most rigorous penances were prescribed. "Let the *Vana-Prastha*," says Manu, in the Institutes, "slide backward and forward on the ground, or stand the whole day on tip-toe, or continue rising and sitting down alternately; in the hot season let him sit exposed to five fires; in the rain let

him stand uncovered; in the cold season let him wear wet garments; then, having stored up his holy fires in his mind, let him live without external fire, without a shelter, wholly silent, and feeding on roots and fruit. When he shall have thus become void of fear and sorrow, and shaken off his body, he rises to the divine essence." The fourth state is that of a *Sannyasi*, in which new and severer penances are to be performed. Suppressing the breath, standing on the head, and other such ceremonies are performed, till the devout patient rises to a participation of the divine nature. It was by the Brahmans that the Sanskrit literature was developed; and they were not only the priests, theologians, and philosophers, but also the poets, men of science, lawgivers, administrators, and statesmen of the Aryans of India. The sanctity and inviolability of a Brahman are maintained, in the eyes of his countrymen, by the most severe penalties. The murder of one of the order, robbing him, etc., are inexpressible sins; the killing of his cow can only be expiated by a painful penance. See Monier-Williams, 'Brahmanism and Hinduism' (1887); Barth, 'Religions of India'; Hopkins, 'Religions of India' (1895).

Brahmaputra, *brā'ma-pō'tra*, a large river of Asia, whose sources, not yet explored, are situated near Lake Manasarovara, in Tibet, near those of the Indus. In Tibet, where it is called the Sanpo, it flows eastward north of the Himalayas, and, after taking a sharp bend and passing through these mountains, it emerges in the northeast of Assam as the Dihong; a little farther on it is joined by the Dibong and the Lohit, when the united stream takes the name of Brahmaputra, literally "the son of Brahma." After entering Bengal it joins the Ganges at Goalanda, and farther on the Meghna, and their united waters flow into the Bay of Bengal. The Brahmaputra is navigable by steamers for about 800 miles from the sea, its total length being, perhaps, 1,800 miles. Through the last 60 miles of its course it is from 4 to 5 miles wide, and studded with islands. Its waters are thick and dirty; its banks are mostly covered with marshes and jungles, and are subject to annual inundations. During the season of the overflow, from the middle of June to the middle of September, the level districts of Assam are almost wholly submerged, so that travel is impossible, except on causeways 8 or 10 feet high. The volume of water discharged by the river at such times is immense. Even in the dry season it is equal to 146,188 cubic feet a second, while in the same time, and under the same circumstances, the Ganges discharges only about 80,000.

Brahmo-Somaj, a religious association of India, founded in 1830 by Rammohun Roy, a famous Hindu rajah, who sought to purify Brahmanism from impurities and idolatries, and first styled "The Society of God." The Brahmo-Somaj, while accepting what religious truth the Vedas may contain, rejects the idea of their special infallibility, and founds its faith on principles of reason. The members do not in principle recognize the distinction of caste, and have made great efforts to weaken this as well as other prejudices among their countrymen. The foremost exponent of its views was the Babu Keshub Chunder Sen, who with his

followers founded the "Brahmo-Somaj of India" in 1858. See Mozoondar, 'Life and Teachings of Keshub Chunder Sen' (1887).

Brahms, Johannes, German composer: b. Hamburg, 7 May 1833; d. Vienna, 3 April 1897. His father was a double-bass player in the Stadt-Theater of his native town, and from him he received his first instruction in musical technique; but his artistic taste was developed under the guidance of the eminent musician, Eduard Marsden of Altona. At the age of 14 years he made his first public appearance as a pianist at Hamburg, playing a set of variations composed by himself. In 1853 he traveled with the noted Hungarian violinist Remenyi on a concert tour of Germany as piano accompanist: this tour was critical for his whole career. In the program of the concert given at Göttingen was Beethoven's Kreutzer Sonata. The piano was a half tone below the true pitch, but Brahms straightway remedied the defect, playing the part from memory and transposing it from A to B flat—a feat which won the admiration of the celebrated violinist Joachim, who was in the audience; and who after the performance made himself known to the young musician; thus commenced a warm friendship which lasted during Joachim's life. He gave the young man commendatory letters to Liszt, then at Weimar, and to Schumann at Düsseldorf, and advised him to give up the concert tour. Brahms acted instantly on this counsel, visited Schumann and showed him some of his compositions, with the result that Schumann recognized in the young artist supreme musical genius, and in his enthusiastic admiration hailed him in an article entitled "Neue Bahnen," published in his 'Neue Zeitung für Musik' as already a master, the great composer of the future, and in the words of John the Baptist (Matt. xi. 3) as rendered in the Latin vulgate, as "he that is to come." Brahms, he declared, had not attained mastery by a gradual development, but had "burst upon us fully equipped as Minerva sprung from the head of Jupiter." Yet at this time the young maestro had produced but very few works—a string quartet, a scherzo in E flat, and a few songs, among them the dramatic 'Liebestreue.'

His eminent gifts were now generally recognized, and after giving a concert in Leipsic, two music publishers made an engagement with him to publish his compositions; and in 1854 he was appointed music master and choir conductor to the Prince of Lippe-Detmold. From 1858 to 1862 he resided first in Hamburg and then in Zürich, making musical tours and pursuing his musical studies. Going to Vienna in 1862 he was director of the Singakademie there in 1863, but after a few months resigned that office and quitted Vienna, to resume his concert tours throughout Germany. He took up his residence again in the Austrian capital in 1872, and thereafter till his death Vienna was his home, though for some years he made musical tours occasionally; but toward the close of his life he devoted himself almost exclusively to the work of musical composition. In 1877 the English University of Cambridge apprised him of its senate's intention to honor him with the degree of Doctor of Music, but Brahms seems to have ignored the intended courtesy.

By his 'German Requiem,' produced in the Cathedral at Bremen in 1868, at a solemn re-

ligious function commemorative of the German soldiers who died in the war with Austria, he fully justified the prophetic utterance of Schumann and won for himself a place in the hearts of the whole German people. He called it the 'German Requiem' to indicate the difference in tone and spirit between it and the traditional requiem, which echoes the doleful strains of the 'Dies Iræ.' In the 'German Requiem' buoyant hope and assurance of God's infinite mercy is the keynote. It is one of a class of sacred compositions, 12 in number, among them the 'Triumphlied' (song of triumph), commemorating the German victories in the war with France in 1871-2, also some choral songs and motets. His other compositions, numbering about 150 pieces, are his secular choral works, among these Schiller's 'Nänie' and the 'Gesang der Parzen' (song of the Parcae); concerted vocal works, among them the 'Liebeslieder' (lays of love); orchestral works, among them four symphonies; chamber music; pianoforte solos; four books of Hungarian dances arranged for pianoforte duet. He never seems to have even attempted to compose an opera, and confessed a distaste for that combination of music and drama. He seldom visited the theatre, and on the rare occasions on which he attended operatic performances he nearly always retired before the completion of the last act.

Brahms is ranked with the classic masters of music, as the peer of Beethoven and Mendelssohn, and inheritor of the traditions of the great school of the German composers. Temperamentally and in his mental habit he is essentially modern, original, and spontaneous; he possesses the warmth of imagination and the quick emotionalism which are assumed to be characteristic of the romantic school, and to these he gives free play. But his creations are cast in the classic molds; or rather they appear to come to the birth naturally in classic forms; hence there is no shadow of incongruity between the matter and the form. See Deiters, translated by Newmarch, 'Brahms: a Biographical Sketch' (1888); Dietrich and Widmann, translated by Hecllet, 'Recollections of Johannes Brahms' (1899).

Braid, James, Scotch physician: b. Fife, 1795; d. 25 March 1860. He studied medicine in Edinburgh, and settled as a surgeon in Manchester. He is noted for his researches on animal magnetism, which he first called neurohypnotism, and afterward termed hypnotism.

Braid'wood, Thomas, Scotch educator: b. 1715; d. 24 Sept. 1798. He studied at the University of Edinburgh, settled as a schoolmaster in that city, and after 1760 became famous as a teacher of deaf-mutes. In 1783 his school was transferred to Hackney, London.

Braille, Louis, 100-ê brâl, or brâ-ê, French educator of the blind: b. Coupvray, 1806; d. 1852. He invented a system of writing with points, used extensively in institutions for the blind. Himself blind almost from birth, at the age of 10 years he was admitted to the Institute for the Blind in Paris, where he soon became proficient in both science and music. In instrumental music he attained a very high rank, becoming one of the most distinguished organists of Paris, and excelling also as a violoncellist. At the age of 20 he had formed the idea of modifying M. Charles Barbier's system of

BRAIN

writing with points so as to render it practicable and convenient, and not long afterward it was introduced into the royal institute, although no account of it was published till 10 years later. It was subsequently adopted in most of the continental schools, and a little later in the United States, where it continues, with some modifications, in successful use. The signs of the original system are 43 in number, embracing the entire alphabet, all the diphthongs, and marks of punctuation. Ten fundamental signs form the basis of all the rest. These signs, representing the first 10 letters of the alphabet and the 10 Arabic numerals, are as follows:

A	B	C	D	E	F	G	H	I	J
.	:	..	∴	.	∴	∴	∴	∴	∴
I	2	3	4	5	6	7	8	9	0

By placing one point under the left side of each fundamental sign, the second series is formed, comprising the next 10 letters. By placing two points under each fundamental sign, the third series, comprising U, V, X, Y, Z, Ç (C soft), È, Å, Æ, U, is formed. By placing one point under the right side of the fundamental signs, the fourth series, embracing Å, Æ, Ì, Ò, U, È, Ì, Ò, Æ, W, is formed. Three supplementary signs represent Ì, Æ, and Ò. The marks of punctuation are the fundamental signs placed two lines below. The system has been applied to musical notation in such a manner as to make the reading and writing of music much easier for the blind than for those who see. The seven notes are represented by the last seven of the fundamental signs, and each of these notes may be written in seven different octaves by merely prefixing a sign peculiar to each octave, and thus the necessity of designating the key of each musical sentence in the ordinary way is avoided. The mode of writing is very simple. The apparatus consists of a board with a surface grooved horizontally and vertically by lines one eighth of an inch apart. Over this board a frame is fitted like that of the common map delineator, and one or more sheets of paper being placed over the board, the points are made with a bodkin, through a slip of perforated tin, ∴, which contains all the changes used in the system. As the sheet must be reversed to be read, the writing should be from right to left, that it may be read from left to right. Of course, several copies may be made by one operation. For many years books have been printed in points in various countries. See **BLIND**.

Brain, that portion of the nervous system contained, for the most part, within the skull. It is usually divided into two parts. The larger mass is termed the cerebrum, the smaller, the cerebellum; from the lower end of the cerebrum the medulla oblongata tapers down into the spinal cord. The brain is, as it were, the great central station of the nervous system. From the surface of the entire body nerve fibres pass into the spinal cord, up the cord and into the brain; these carry impressions of all kinds—touch, taste, sight, hearing, pain, temperature, etc.—from the surface to the brain. Starting in the brain mass itself there is a corresponding series of fibres that run down into the medulla and spinal cord, out into the nerves and end in some muscle or organ of special character. There are literally thousands of incoming fibres, thousands of outgoing fibres and millions of minute cells in direct association with these fibres. Thus it may be seen that the brain is merely a collection of nerve ganglion cells and their associated fibres, both of which have a characteristic appearance as seen by the naked eye; that portion of the brain that preponderates in cells is the "gray matter," and that portion richer in fibres is the "white matter."

Cerebrum.—The larger brain mass, the cerebrum, consists of two symmetrical halves, the hemispheres, separated above by the great longitudinal fissure and held together at the bottom of the fissure by a firm band of fibres, the callosum, and at the base by the cerebral peduncles, which unite below to form part of the pons, and the medulla. All of the fibres passing to and fro go up and down in the peduncles, separating into each hemisphere. The surface of the hemispheres is divided by fissures into several larger areas and a number of smaller ones. Thus in the lower side there is a large fissure, the fissure of Sylvius, below it there are three lobes, the first, second, and third temporal lobes. Running from the great longitudinal fissure, making an angle of about 65° with the Sylvian fissure, the second most marked fissure, that of Rolando, is found. This divides off an anterior region in which the first, second, and third frontal convolutions are to be found. Immediately around the fissure of Rolando are grouped the anterior and posterior parietal lobes, and at the back end of the hemispheres the occipital lobes are situated. All of these lobes are divided into smaller areas by the fissures, the chief end subserved by these fissures being to

HUMAN BRAIN.

FIG. 1.—HEAD AND NECK, SECTION FROM FRONT TO BACK.

1, Wind-pipe; 2, Larynx; 3, Spinal marrow; 4, Pharynx; 5, Tongue or Hyoid bone; 6, Epiglottis; 7, Tongue; 8, Hard palate; 9, Soft palate; 10, Bridge of the nose; 11, Frontal cavity; 12, Sphenoid cavity; 13, Nasal cavity; 14, Skin of the skull; 15, Bony skull; 16, Hypophysis; 17, Corpus callosum; 18, Septum lucidum; 19, Straight sinus; 20, Cerebellum; 21, Cerebrum, right hemisphere; 22, Lobes of the Medulla; 23, Pons Varolii; 24, Medulla Oblongata; 25, Zone of the Epistropheus; 26, Vertebra; 27, Spinal continuation of the Vertebrae.

FIG. 2.—BRAIN, CROSS-SECTION FROM LEFT TO RIGHT.

1, Thalamus; 2, Skull; 3, Cerebral membrane; 4, Cerebral hemisphere; 5, Lateral ventricle; 6, Optic lobe; 7, Septum lucidum; 8, Longitudinal sinus; 9, Great longitudinal fissure; 10, Corpus callosum; 11, Median cerebral cavity; 12, Cerebral hemisphere; 13, Gray matter; 14, White matter; 15, Corpora Albicantia.

FIG. 3.—BRAIN VIEWED FROM ABOVE.

1, Occipital convolution; 2, Occipital lobe; 3, Inner

parietal convolution; 4, Left cerebral hemisphere; 5, Inner frontal convolution; 6, Right cerebral hemisphere; 7, Frontal lobe; 8, Longitudinal fissure; 9, Median frontal convolution; 10, Occipital centre convolution; 11, Frontal centre convolution; 12, Outer frontal convolution; 13, Outer parietal convolution; 14, Median parietal convolution.

FIG. 4.—BASE OF THE BRAIN.

1, Eleventh or spinal accessory nerve; 2, Right hemisphere of cerebellum; 3, Twelfth or hypoglossal nerve; 4, Ninth or glosso-pharyngeal nerve; 5, Eighth or auditory nerve; 6, Seventh or facial nerve; 7, Medulla Oblongata; 8, Fifth or trigeminal (trifacial) nerve; 9, Central lobe; 10, Fourth or trochlear nerve; 11, Sixth or abducent nerve; 12, Pons Varolii; 13, Right frontal lobe of the cerebrum; 14, Lobes of the medulla; 15, Optic chiasm; 16, Second or optic nerve; 17, Left frontal lobe; 18, First or olfactory nerve; 19, Sylvian fissure; 20, Third or ocula-motor nerve; 21, Tenth or pneumogastric nerve; 22, Left hemisphere of the Cerebellum.

BRAIN

increase the amount of outside surface of the hemispheres and thus make room for the enormous number of cells that are located in this outermost gray layer, the cortex. A further function seems to be expressed by this division into lobes and convolutions, namely, a localization of function, a concentration of energy as it were, certain types of brain activity being regulated in certain brain areas. Thus it is assumed that the main function of the frontal lobes is largely that of the reasoning faculties and higher intellectual processes. It is very well established that the cells in the cortex that are grouped up and down both sides of the fissure of Rolando are the cells that govern the motor acts of the body; irritate these, and muscular convulsions in certain groups will occur; destroy them by accident or disease, and paralysis, or loss of muscular function, will result. The localization for certain muscle groups, such as those for the head, arm, eyes, leg, etc., are very well known. In the occipital lobes, particularly in certain areas about the angular gyrus, are the centres for sight memories. Their destruction may result in mind blindness (see *APHASIA*). In much the same manner the memories of sound are located in the temporal convolutions, and there are a large number of areas thus localized. These different areas are all brought into connection, the one with the other, by hosts of fibres, and as already indicated the two hemispheres of the cerebrum are connected by thousands of fibres that are in the callosum. Thus in the adult normal cerebrum all parts of the cortex are brought into close connection with one another and with the other half of the cerebrum; the connections with the cerebellum and with the cord are established as well. The richness of association is an index of the education and intelligence of the individual. These cortical connections are not a helter-skelter, hit-or-miss system; they are all carefully laid down, constituting the human brain one of the most remarkable "switchboards" ever made. Modern anatomy is busy unraveling all the fibres and bundles of fibre tracts, and it will not be many years before the map of the brain will be as well known as that of New York. When that time arrives many unknown problems of nervous and mental disease will be solved and the hideous secrets of the insanities will be laid bare.

In addition to the cortical ganglionic masses of cells, there are a number of similar masses of cells located within the substance of the brain mass. These are subsidiary stations, as it were, for many of the fibre tracts going to and coming from the cortex. These are the caudate and lenticular nuclei, the optic-thalamus, and a number of smaller ones.

Cerebellum.—The cerebellum, or little brain, is situated behind and almost beneath the cerebrum, which partly overlaps it. It is attached to the brain stem by peduncles and its connections with the cerebral centres and those of the cord are many and complex. In minute structure the cerebellum has a number of characteristic features by which it may be recognized under the microscope, but fundamentally the nerve cells are similar, the interstitial connective tissue is the same in kind as in the cerebrum and the blood vessels, veins, and lymphatics have similar properties.

Membranes.—Surrounding the entire brain mass and extending down over the spinal cord there are three coverings. These are an outside strong and thick dura mater, and two inside delicate membranes, the arachnoid and pia mater.

Cavities.—The brain is not a solid organ. It is really a flattened-out expansion of nervous tissue peculiarly grouped about a central cavity. This central cavity at one time was as simple almost as the space occupied by the graphite in a lead pencil, but in the adult brain there are lateral ventricles, third and fourth ventricles, all of which are too complicated to be described here. The ventricles contain a fluid, the cerebrospinal fluid, which also bathes the outside of the brain. The cavities of the brain are continuous with the central cavity of the spinal cord.

This modern conception of the brain as a complicated automatic switchboard may be elaborated to any amount of detail. If one should trace, however, the path of a single impulse from the outside world, be it one of sight, smell, taste, touch, pain, etc., one would trace it, say for pain—first from the point of contact, for instance, of the finger, whence the special nerves of sense would carry it to the spinal cord; here it travels up a definite tract in the cord (for the upward paths of the passages of sensations and the downward ones of messages to act are as definitely known as are the railroads from New York to Chicago); from the cord it passes into the medulla, still in a well-defined path, where only it and its kind travel (about here the fibre tract crosses to the opposite side of the medulla); then through the pons, through the cerebral peduncles, up to the secondary centres, to the cerebellum and the sensory area in the cortex, which is supposed to be situated just behind the motor area. As soon as the sensory impulse reaches the cortex it is felt as pain and referred to the spot in the skin in contact with the irritant. Immediately in the perception of pain, so intimate are the connections of the sensory areas with the motor areas from these motor cells a conscious impulse is flashed down another series of fibres, down the peduncles to the medulla (where the fibres also mostly cross to the opposite side), down the spinal cord, out on a motor nerve to the muscle to cause a muscular act of pulling the hand away from the harmful irritant. This is the long, conscious series. There may also have been a shorter reflex cycle whereby the impulse passed to the spinal cord and an immediate motor connection was made that caused a quick jerking away of the hand, even before the perception of the sensation had taken place. This is the reflex cycle. See *REFLEX ACT*.

The study of the comparative anatomy and physiology of the nervous system is one of the most enchanting departments of human knowledge. To trace the gradual development of this intricate and marvelously adjusted regulator of the entire body, from its simplest terms of "protoplasm irritability" through the isolated ganglionic masses in such animals as the starfish, the gradual chaining of one mass to another as in the worms and insects, thus bringing a certain relation of one part to another, up to the fusion of different ganglionic masses to form a chief mass, the brain, and secondary masses, the spinal cord—this is a story of so many chapters and volumes that it cannot even be sketched here; but it is

HUMAN BRAIN.

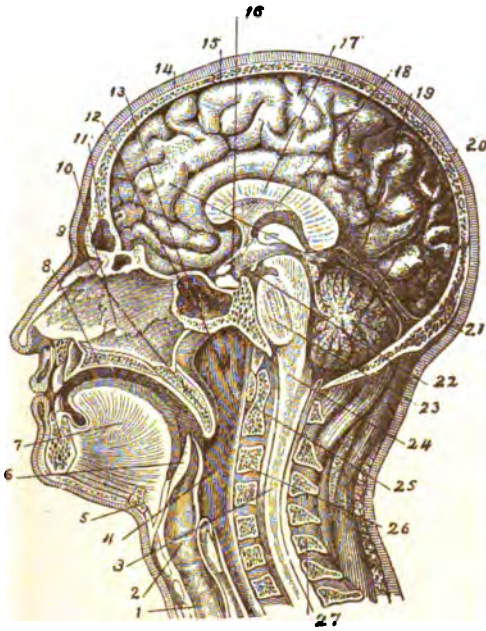


Fig. 1.

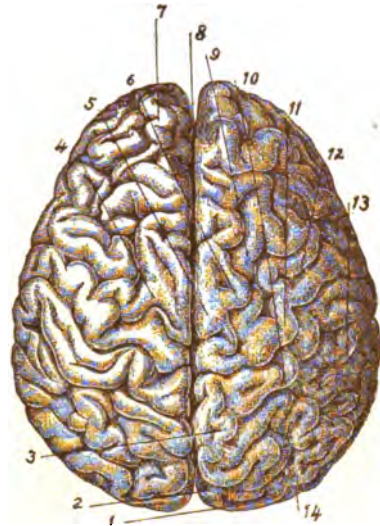


Fig. 3

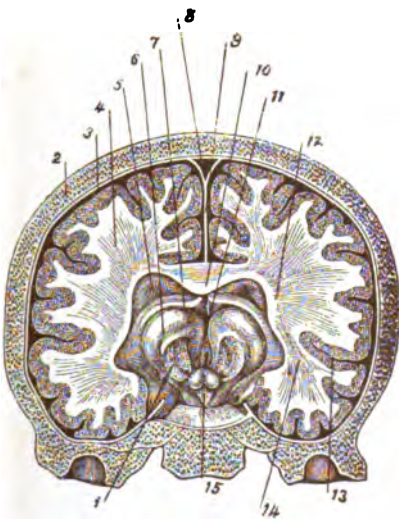


Fig.2

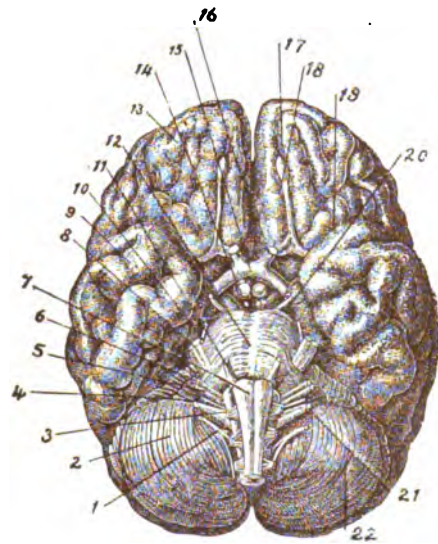


Fig. 4.

BRAIN — BRAINARD

very certain that the gradual evolution of the nervous system shows the extreme complexity of man's activities. Although throughout the entire series, nerve cells are alike, it is only in the great multiplicity of co-ordinations and connections that man's brain differs from the nervous system of a jellyfish or a worm. It is only in the animal series beginning with *Amphioxus* that a distinct brain mass commences to be seen. But from this point forward the modification in form, size, and complexity is gradual. While man has the most complex brain, he has not the heaviest brain, although in comparison with his size it is the heaviest. The brain of man is usually heavier than that of woman, although at birth and at the age of 14 the female brain is heavier. Taller and heavier persons have usually heavier brains. Weight of brain, however, has no direct relationship with intelligence, as idiots' brains are known that have weighed as much as those of many of the ablest of men. Intellectual capacity, as already said, consists in the great multiplicity of nerve cell connections. In which connection it might also be added that the shape and size of the outside skull bears no constant relation to the shape and size of the inside brain. Cuvier's brain weighed 84 ounces, Gambetta's only 39 ounces. While it is true that a number of celebrated men of recognized brain power have had large brains, there are many more of equal capacity whose brain weights have not been remarkable. Also see **MOTOR AREA; MOTOR CO-ORDINATION; NERVOUS SYSTEM; SPEECH CENTRES; TASTE AREAS.** Consult: Barker, 'The Nervous System' (1901); Schäfer, 'Physiology' (1900); Krause, 'Surgery of the Brain' (1910). SMITH ELY JELLIFFE, *Journal of Nervous and Mental Diseases.*

Brain, Diseases of. These are so many and so diverse that a general article cannot readily be written upon them. In general they may be divided into: (1) Developmental defects. These are considered under idiocy, imbecility (q.v.), etc. (2) Acute infections in which the brain itself or its surrounding membranes are attacked by some form of bacterium, such as the influenza bacillus, the pneumococcus, that ordinarily is the main cause of pneumonia, the typhoid organism, or certain forms of cocci. These diseases are discussed under the heads, encephalitis, meningitis, cerebral abscess, epidemic cerebro-spinal meningitis (q.v.). (3) Acute and chronic poisoning, including delirium tremens in alcoholism (q.v.), toxic manias (q.v.), etc. (4) Diseases of the blood vessels of the brain. Here is to be classed the general disease apoplexy. This is really three different diseases due to cerebral hemorrhage, cerebral thrombosis, or cerebral embolism. These are discussed here. In all, the symptoms are much alike, as similar areas in the brain may be affected by each. In hemorrhage there is a bursting of one of the cerebral blood vessels, with pouring out of blood into adjacent brain tissue and destruction. A certain blocking of the artery also results. In thrombosis, the walls are diseased and a soft mass collects on the inside of the blood vessel in the brain and blocks it up. This shuts off the circulation in a certain area supplied by the artery and there is degeneration in that area with softening perhaps and cyst formation. In embolism some foreign

body from some other part of the arterial system is swept into a blood vessel of the brain and blocks it up. In all three forms of apoplexy the attack may be very slight, if the cause is slight, a temporary loss of consciousness, or a paralysis in one limb, or a hemiplegia that is transitory—these may be all that is noted. But the usual attack of apoplexy is much more severe. The patient is rendered unconscious, the face is purple or congested, there may be voiding of urine and feces, the breathing is slow and snoring in character, the pulse is usually slowed to 50, and often soft and full; nausea and vomiting and lowered temperature may also occur. The pupils may be dilated and the eyes may appear crossed. There is usually noted a difference in the two sides of the face, one side of the body is different from the other, and on lifting the limbs there is a change in their resistance. The patient may remain in this condition and die very soon, or he may have a rising temperature for a week and then die, or he may recover consciousness to find that one entire side of his body is paralyzed, or incapable of being moved by the will. If the right side is involved the patient usually has defects in his speech (aphasia, q.v.). After a few days, this paralysis may pass away, but it usually persists for life in some form or other. Almost invariably the paralyzed limbs improve greatly; at first the leg and later the arm, and the improvement may be very great so that only a slight trace of what was a disabling affliction remains. The shades and variations in symptoms and in the outcome are numberless. The treatment of an attack of apoplexy requires prompt attention. Heat to the extremities, mustard bath to the feet, absolute quiet, removal of constricting bands about the neck, placing the patient on the non-paralyzed side, in many cases blood-letting; these are the generally recognized things to do. The outlook is always serious. Hemorrhage is apt to occur in those over 50, thrombosis in those affected with syphilis, and may occur at any age, embolism usually accompanies some infectious disease, such as pneumonia, rheumatism, scarlet fever, childbirth fever, etc.; and may affect old or young (see **DIPLEGIA; HEMIPLEGIA; MONOPLEGIA**). (5) Accident or injury to the brain. These may occasion various forms of hemiplegia; diplegia, particularly in the injuries of childbirth; epilepsy, etc. (6) Tumors of the brain (see **TUMOR**). (7) Organic disease of the brain functions. Here the various insanities may be classed. Softening of the brain is a term denoting either a dementia (q.v.) of old age, or the insanity known as general paresis (q.v.). The insanities in their various forms and phases are treated in their appropriate relations under one inclusive head. See **INSANITY**.

SMITH ELY JELLIFFE,
Editor 'Journal of Nervous and Mental Diseases.'

Brain Fever. See **BRAIN, DISEASES OF.**

Brainard, David Legge, American soldier and explorer: b. Norway, N. Y., 1856. Entering the United States army in 1876 he served in Indian campaigns and subsequently accompanied the Greeley Arctic expedition 1881-2. He was sergeant in the signal service, served in the Alaskan relief expedition in 1897 and went to the Philippines in 1900 as a major in the subsistence department of the regular army.

BRAINARD — BRAINTREE RESOLUTIONS

Brainard, John Gardiner Calkins, American poet and journalist: b. New London, Conn., 21 Oct. 1796; d. 26 Sept. 1828. After graduation at Yale in 1815 he studied law and practised at Middletown, Conn. In 1822 he went to Hartford and edited the *Connecticut Mirror*, in which many of his early poems appeared. In 1827 he was forced by failing health to resign his editorship. For a time he resided on Long Island, whence he returned to New London to end his days. He issued a volume of poems in 1825, a second and fuller edition of which, under the title of 'Literary Remains,' was published in 1832, with a biographical sketch by John Greenleaf Whittier.

Braine, Daniel Lawrence, American naval officer: b. New York, 18 May 1829; d. 30 Jan. 1898. He entered the United States navy in 1846 and became a rear admiral. He served with distinction through the Mexican and Civil wars. In 1873 he obtained the surrender by Spain of 102 survivors of the Virginian prisoners.

Braine-le-Comte, brān-lé-kōnt, Belgium, a small and ancient town of the province of Hainaut, about 20 miles southwest of Brussels. It contains a handsome church, founded in the 13th century, and a large well-built château. The Southern Railway branches off from this town, on the west side to Mons and Quiévrain, east to Namur and Charleroi. Among its manufactures are breweries, wire-works, dyeworks, oil-, cotton-, and corn-mills. At one time it manufactured and dealt extensively in tin wares, but this branch of trade is almost if not entirely extinct.

Brainerd, David, a missionary to the Indians: b. Haddam, Conn., 20 April 1718; d. Northampton, Mass., 9 Oct. 1747. Early impressible by religious influences, he felt himself suddenly converted while taking a walk, 12 July 1739, and the same year entered Yale College to prepare himself for the ministry. Instead of graduating in the regular course he was expelled from the institution in 1742 for having said, in his zeal, of one of the tutors, that he had no more of the grace of God than a chair. He was, however, licensed in July as a preacher, and received an appointment from the society for the propagation of Christian knowledge, as missionary among the Indians near Stockbridge, Mass. He was ordained in 1744, and took up his work among the Indians at the forks of the Delaware in Pennsylvania, making two visits to the Indians of the Susquehanna. He met, however, with but little success, until, after a year, he went to reside among those at Crossweeksung, near Newark, N. J. Here he is said to have produced a great change among the savages, and to have baptized 78, of whom 38 were adults. Having worn out his health by his labors, he set out on a journey to Boston in the spring of 1747, and thence to Northampton, where he died after a short stay in the family of President Edwards, by whom his biography was soon afterward written. His published works are: 'Wonders of God Among the Indians,' and 'Grace Displayed.'

Brainerd, Minn., a city and county-seat of Crow Wing County, 115 miles west of Duluth, situated on the east bank of the Mississippi River and on the Brainerd & N. R.R. It lies in a fertile farming region and trades in grain

and other agricultural produce. Lumber and furs are also exported. Here are situated the extensive shops of the Northern P. R.R. There are foundries, flour-mills, a large saw-mill, etc. There is a United States signal service station, a hospital for employees of the Northern P. R.R., and another for lumbermen, a public park, waterworks, electric street railway, electric lighting plant, etc. The city is governed by a mayor, elected biennially, and a city council. Pop. (1910) 8,526.

Brain'stone Coral, a madreporé of the genus *Meandrina*, so named from the general resemblance to the brain of man exhibited in its large rounded mass and numerous winding depressions. When the hemispherical mass is broken, the ridges which bound its furrows (each of which represents the place of a polyp) may be traced inward through its substance.

Brain'tree, Mass., a town in Norfolk County, on the New York, N. H. & H. RR., 10 miles south of Boston. It contains the villages of South and East Braintree; is connected by electric street railroads with the principal neighboring towns and villages, and its industries include granite-quarrying, and the manufacture of rails, tacks, shoes, wool, rubber goods, fans, etc. John Adams, John Quincy Adams, and John Hancock were born in a part of Braintree now within the limits of Quincy. The town was settled about 1629 and was incorporated in 1640. Pop. (1910) 8,066.

Braintree Resolutions, *The*. There were instructions given by the town of Braintree, Mass., on 24 Sept. 1765, to its representative in the Massachusetts General Court, Ebenezer Thayer, relative to his action in the matter of the Stamp Act. They were drawn by John Adams, one of a committee appointed by the Braintree town meeting for that purpose, accepted unanimously, and published in the *Boston Gazette*. Some 40 Massachusetts towns subsequently adopted them verbatim as their instructions to their own representatives; and John Adams says that Samuel Adams copied several paragraphs into his own draft for the Boston town-meeting. The resolutions declared the tax, even if legal, an unbearable burden and a vexatious interference with the business of a poor and sparsely settled province; that moreover, it was contrary to British common law, and the "foundation principles of the British constitution, that we should be subject to any tax imposed by the British Parliament, because we are not represented in that assembly in any sense, unless it be by a fiction of law"; that to put the cases in the decision of one judge without a jury was "an alarming extension of the power of courts of admiralty," and repugnant to the Great Charter itself, especially as the judges held office only during the pleasure of the Crown, and moreover had a commission on the goods condemned. They enjoin the Braintree representative to "comply with no measures or proposals" for executing the law, but "by all lawful means" obstruct it; to favor entering on the public records "the most clear and explicit assertion of our rights and liberties"; and—most significant of all—"to agree to no steps for the protection of the stamped paper or the stamp officers, because any addition to the laws for preserving the peace would only exasperate the people and endanger public tranquillity."

BRAITH — BRAMBLING

Braith, Anton, ān'tōn brīt, German painter: b. Biberach, Württemberg, 1836. He was educated at the Stuttgart Art School and the Munich Academy, and soon obtained distinction by his skill in landscape and animal painting. Among his best works are 'A Yoke of Oxen'; 'A Grazing Herd'; 'Going to Drink'; 'Herd Overtaken by a Storm'; 'After the Storm.'

Brake, Bracken, common names for a fern (*Pteris aquilina*) of the family *Polypodiaceæ*, widely distributed in Europe, Asia, and North America, where it often dominates the vegetation of heaths, neglected meadows, etc. It does not fall when the top is killed by frost, and affords excellent cover for small game. From its long, creeping rootstocks, naked stalks, 6 to 20 inches in length, are sent up. Each stalk produces three branches with numerous fern-like pinnate leaves, along the covered edges of which are borne the sori, or spore-producing organs. The rootstock, which is bitter, has been used as a substitute for hops in beer-making, and is still somewhat employed in dressing chamois and kid leather. The tops are often used for bedding animals, and are sometimes mixed with hay as fodder. Although land covered with brake is considered inferior, many such soils, when cultivated, are found to be good. By frequent mowing, or by plowing, the land is readily freed from brake. Several other species of *Pteris* have been called brake and bracken, and some are cultivated as ornamental plants in greenhouses and window-gardens. The rootstocks of a New Zealand species (*P. esculenta*) are often used for food, and are better suited for such use than those of the first-named species, which have served such a purpose only when ordinary food-supply has been scarce.

Brake, a mechanical device for retarding or arresting by means of friction the motion of a wheel or shaft. A wood or metal block, so arranged as to be pressed by levers against the rim of a wheel, constitutes a shoe-brake, the kind used in checking ordinary vehicles, such as wagons. A band passing around a wheel, and which, by tightening, retards its motion, forms a band-brake. The air-brake is the form of mechanism generally used on railroads. See AIR-BRAKE.

Brakelonde, Jocelin de, English chronicler: b. Bury St. Edmunds, in the 12th century. In 1173 he entered the convent of St. Edmunds and began his chronicle which extends over a period of nearly 30 years. The character of the abbot, Samson, described in these annals, influenced Carlyle in the writing of 'Past and Present.'

Bramah, brā'mā, Joseph, inventor of the Bramah lock, the Bramah press, etc.: b. Stainborough, Yorkshire, England, 1749; d. 1814. He was first apprenticed to a carpenter and joiner, but finally established himself in business in London as manufacturer of various small articles in metal-work. His subsequent life was distinguished by a long series of inventions, many of which have been found of great utility. Beside those already mentioned, he invented the apparatus used in public houses to bring liquors from the cellar to the bar, and ingenious printing machines. He also made improvements in fire-engines, steam-engines, the manufacture of paper, etc.

Bramante, brā-mān'tē, Donato d'Agnolo, Italian architect: b. Monte Asdroaldo, near Urbino, about 1444; d. 11 March 1514. He applied himself first to painting, but his passion for architecture soon gained the ascendancy, and he shares with Brunelleschi the credit of restoring this art. While yet a young man he went to Milan, where his time was mainly spent at the cathedral. Pope Alexander VI. named him as his architect, and Julius II. made him superintendent of his buildings. At the command of the latter he united the Belvidere with the palace of the Vatican. He persuaded the Pope to order the Church of St. Peter to be torn down, and another to be erected in its place, which should be without an equal in the world. In 1513 the foundation of the present St. Peter's was laid, according to the plan of Bramante. It yet remains the greatest achievement of modern architecture. Bramante did not live to see this work completed. He had begun the edifice with incredible dispatch, but his successors, Raphael, Julius of San Gallo, Peruzzi, and Michael Angelo, altered the original plan, and left nothing of Bramante's workmanship standing except the arches which support the tower of the dome. His writings, in prose and verse, first discovered in 1756, were printed in the same year at Milan.

Bramathærium, a genus of antilopidæ, consisting of a gigantic species with four horns. It is allied to sivatherium, which also is four-horned. Both occur in the Upper Miocene, or Lower Pliocene beds of the Sewālik Hills in India.

Brambach, Kaspar Joseph, kas'par yō'zēf brām'baŋ, German composer: b. Bonn, 14 July 1833. He was a pupil at the Conservatory in Cologne (1851-4), and at Frankfurt-on-the-Main he studied under Ferdinand Hiller. In 1859 he became a teacher at the Cologne Conservatory, and in 1861 went to Bonn as state musical director. Giving up that position in 1869, he devoted himself to the work of composing and private teaching. His best works are his cantatas, including 'The Eleusinian Festival'; 'A Hymn to Spring'; 'The Power of Song'; 'Alcestis'; 'Prometheus'; 'Colombus'; and 'Lorelei.' He has also written an opera, 'Ariadne,' and several minor pieces.

Brambanan, brām-bā'nān, a district of the province of Surakarta, Java, rich in remains of Hindu temples, of which there are six groups, with two apparently monastic buildings. The edifices are composed entirely of hewn stone, and no mortar was used in their construction. The largest is a cruciform temple, surrounded by five concentric squares, formed by rows of detached cells or shrines, embracing an area 500 feet square. In several of these *dagobas* the cross-legged figures of Buddha remain, but the larger figures which must have occupied the central temples have disappeared from all but one.

Bramble, a common, but, in America, little used name for various species of the genus *Rubus*, including blackberry, raspberry, and dewberry. In Europe it is more restricted to *R. fruticosus*, which, from its abundance and its weedy character, has not received the attention of horticulturists.

Brambling, or Mountain Finch, a large migratory finch (*Fringilla montifringilla*), found throughout Europe and in Asia, where it breeds

BRAMHALL — BRANCHIOPODA

in the northern parts. It is a brightly colored bird, and nearly related to the chaffinch (q.v.).

Bramhall, brām'hôl, **John**, Anglican prelate in Ireland: b. Pontefract, Yorkshire, England, 1594; d. 25 June 1663. He was educated at Cambridge, and was on the road to high preferment when he went to Ireland as Wentworth's chaplain in 1633. He soon became archdeacon of Meath, and was consecrated bishop of Derry in 1634. When the civil war broke out, for safety he crossed to England, but the Royalist disasters soon drove him to the Continent. At Paris he disputed with Hobbes on necessity and the freedom of the will. At the Restoration he was given the metropolitan see of Armagh. Bramhall closely imitated Laud in policy, and even resembled him in person, but was far his inferior in intellect. Not strong, but merely obstinate in purpose, the so-called Athanasius of Ireland by his impolitic intolerance sealed the doom of Episcopalian supremacy in Ulster.

Bramley, Frank, English artist: b. near Boston, Lincolnshire, 6 May 1857. He was educated at Lincoln and studied art at Antwerp. Among his works are 'Domino' (1886); 'Old Memories' (1892); 'For of Such is the Kingdom of Heaven' (1891); 'A Mute, Inglorious Milton' (1898); and several notable portraits.

Bran, the husks of ground corn, wheat, rye, or other cereals, separated from the flour. The nutritive value of these husks increases as we proceed from the outside of the grain toward the interior. The outer skin, or coarse bran, is very indigestible, owing to the presence of a layer of silica. The inner skins, called pollards, are more nutritious, containing from 12 to 15 per cent of nitrogenous matter, and from 20 to 30 per cent of starch. Unless ground very finely, however, they are apt to occasion irritation of the bowels and diarrhoea. Though rich in nitrogen, bran appears to possess but little nutritive power. It may be of use to the well fed, who need a laxative, but to the poor who need nourishment it is of very little use. It is, however, of some commercial value, being largely employed in the feeding of horses and cattle, and in brightening goods during the processes of dyeing and calico printing.

Branca, Ascanio, Italian statesman: b. 1840. He studied law at Naples and did journalistic work, and in 1870 was elected to the Italian Chamber of Deputies. He was later made secretary of the ministry of commerce but withdrew from this position in 1885, disapproving of the policy of the ministry. In 1891-2 he was minister of public works in Rudini's cabinet; in 1896-8 minister of finance, and in 1900-2 again minister of public works. He has written 'International Banking and Credit' (1871).

Branch, John, American statesman: b. Halifax County, N. C., 4 Nov. 1782; d. Enfield, N. C., 4 Jan. 1863. He graduated at the University of North Carolina (1801), studied law, became a judge of the superior court, State senator (1811-17). He was governor of his State (1817-20), and a member of the United States Senate (1823-9). He was appointed secretary of the navy by President Jackson, and held this office till the breaking up of the Cabinet in 1831. In 1835 he was a member of the convention to

revise the State constitution, and in 1843 was appointed governor of the Territory of Florida, serving until the election of a governor under the State constitution, when he retired to private life. See Lanman: 'Biographical Annals of the Civil Government of the United States.'

Branch, Mary Lydia Bolles, American writer of stories for young people: b. New London, Conn., 13 June 1840. She was married to John L. Branch in 1870. Her published works include 'The Kanter Girls' (1893); 'The Old Hempstead House' (1896).

Branch, that portion of a plant produced from a lateral leaf bud on the primary axis or stem. It is looked upon as part of the stem, and not as a distinct organ. A branch generally produces secondary branches, and these give rise to minor ramifications, called branchlets or twigs. The different modes in which branches spring from the stem give rise to the various forms of trees; such as pyramidal, spreading, and weeping. Thus, in the cypress, the branches are erect, forming acute angles with the upper part of the stem; in the oak and cedar, they are spreading, each forming nearly a right angle; in the weeping ash and elm, the angles are oblique; while in the weeping willow and birch, the branches are pendulous, from their flexibility. The comparative length of the upper and under branches also gives rise to great differences in the contour of trees, as seen in the conical form of the spruce, and in the umbrella-like shape of the Italian pine.

Branchial Cysts and Fistulas. In early fetal life the human being possesses a series of four gills or branchi, and five clefts on each side of the head and neck, which in the course of development give rise to the upper and lower jaw and other structures. Should a cleft fail to completely fill in as the body grows it leaves a cavity or branchial cyst, which may at any time become inflamed or develop an abscess. If the opening on the neck persists it is a branchial fistula.

Branchiata, a name applied to all those marine arthropod animals which breathe by gills. The groups include the trilobites, merostomes, and crustacea, but excludes the arachnida. On this account the branchiata is believed by the best authorities to be an artificial group, and the term has therefore been abandoned.

Branchidae, the name of an hereditary family, the descendants of Branchus; also of a place founded by them. Their original seat was a little south of Miletus in Ionia, where was the famous temple of Apollo Didymeus. After the destruction of the temple, probably toward the close of the 5th century B.C., an attempt was made to rebuild it, but on so colossal a scale that the project was never completed. Its ruins are of great interest to archaeologists. Some of the statues, formerly erected along the road leading to the temple, have been removed to the British museum.

Branchiopoda, a division of crustacea of the division *Entomostraca*. They are for the most part microscopic, and are chiefly distinguished by having the gills attached to the legs, which are generally numerous. The body is sometimes naked, but more frequently is enveloped by a buckler, which in some covers only the head and thorax, and in others the whole

BRANCHIOSAURUS — BRANDES

body. Some have two or even three eyes, but a greater number have one only. They are all free and continually in motion. Among the *Branchiopoda* are the water-fleas and brine-shrimps, and some also rank the trilobites among them.

Branchiosaurus, an extinct genus of *Amphibia* (q.v.), whose remains have been found very abundantly and very perfectly preserved in the Permian shales of Saxony. It is of especial interest among fossil amphibians because it has been possible to study every stage of its development from embryo to adult. The animal was but a few inches long, proportioned like a salamander, with four limbs and five toes on each foot. Like the modern tadpole, the larva breathed by external gills which were replaced by lungs in the adult.

Branco, Rio, a river of north Brazil, the chief tributary of the Rio Negro. It is 400 miles in length, but 250 miles from its confluence with the Rio Negro navigation is blocked by falls.

Brand, Sir Jan Hendrik, Boer statesman: b. Cape Town, 6 Dec. 1823; d. 15 July 1888. He studied law in Leyden and in 1849 began to practice in the supreme court at Cape Town. In 1853 he became professor of law in the South African College. He early became prominent in public affairs, his sympathies being strongly pro-British. His influence prevented any participation of the Orange Free State in the movement to check British policy in South Africa. In 1863 he was elected president of the Orange Free State and was re-elected every five years until his death. Queen Victoria knighted him in recognition of his aid. Brandford was named in his honor, and Ladybrand was named in honor of his wife.

Brande, William Thomas, English chemist: b. London, 11 Feb. 1788; d. Tunbridge Wells, England, 11 Feb. 1866. He was educated at Westminster School, studied medicine and became an assistant to Sir Humphry Davy, succeeding him in 1813 in the chair of chemistry at the Royal Institution. In 1828 he became a superintendent in the mint. He wrote several standard books on chemistry. His chief works are: 'A Manual of Chemistry,' 'Outlines of Geology,' and an 'Encyclopædia of Literature, Science, and Art' (1842).

Brandeis, Frederick, American organist: b. Vienna, Austria, 1835; d. New York, 1899. At Vienna he studied under Fischhof and Czerny. In 1851 he settled in New York, and between 1865-98 filled positions as organist at the Catholic churches of St. John the Evangelist and St. James, and the 44th Street Synagogue, and the Church of Saint Peter and St. Paul in Brooklyn. He composed numerous instrumental and vocal pieces, but is best remembered for his song, 'My Love is Like the Red, Red Rose.'

Brandenburg, a province of Prussia, surrounded mainly by Mecklenburg and the provinces of Pomerania, Posen, Silesia, and Prussian Saxony. The soil consists in many parts of barren sands, heaths, and moors; yet the province produces much grain, as well as fruits, hemp, flax, tobacco, etc., and supports many sheep. The forests are extensive. The principal streams are the Elbe, the Oder, the Havel, and the Spree. Brandenburg carries on an active trade in manufactured articles, and includes, besides some

other districts, the greater part of the former Mark of Brandenburg, which formed the cradle of the Prussian monarchy, and the centre round which the present extensive kingdom has grown up. It is divided into the three administrative divisions of Berlin, Potsdam, and Frankfurt, and has a total area of 15,381 square miles. The most of the inhabitants are Lutherans; the rest are chiefly Roman Catholics and Jews. From 1685 to 1688 many French refugees, Walloons, and inhabitants of Lorraine and of the Palatinate, settled in the Mark. At present Brandenburg is the most important of the Prussian provinces, including as it does the capital (Berlin), and the governments of Potsdam and Frankfurt. The first people who are known to have inhabited Brandenburg were the Suevi. They were succeeded by the Slavonians, a barbarous people, whom Henry I. conquered and converted to Christianity in the early part of the 10th century. The government was first conferred on a Saxon count, and did not become hereditary till the time of Albert, whose son succeeded to the dignity of elector in 1180. This race becoming extinct, Charles IV. assigned the electorate to his son Sigismund, who became emperor in 1415, and sold the region to Frederick, burgrave of Nuremberg, the ancestor of the present reigning family. Frederick William the Great made various accessions to the territories of his ancestors, and obliged the king of Poland, in 1656, to declare Prussia an independent state. The Old Mark was ceded to Napoleon in 1807, and formed part of the kingdom of Westphalia; but it was restored to Prussia in 1814. The elector of Brandenburg held the seventh rank among the electors of the empire, and had five votes in the Council of Princes. Pop. about 3,600,000. See PRUSSIA.

Brandenburg, a Prussian city, on the Havel, 35 miles west of Berlin, formerly the residence of the reigning family of Prussia. The Havel here expands into a lake, and divides Brandenburg into the Old Town, the New Town, and the Cathedral Island, the last containing a castle and the cathedral. The latter is a late Romanesque building (1170-1318), restored in the 19th century. The industries embrace woolen yarn, silk goods, baskets, leather, etc., and the building of boats is also carried on. Pop. about 50,000.

Brandenburg, Confession of, a confession of faith issued in 1614 by the elector of Brandenburg. It was an attempt to reconcile the religious controversies growing out of the differences in Lutheran and Calvinistic doctrine.

Brandenburg, New. See NEU BRANDENBURG.

Brandes, Georg Morris Cohen, Danish literary critic of Jewish family: b. Copenhagen, 4 Feb. 1842. He graduated at the University of Copenhagen in 1864, and taught there, 1872-7. Several books on æsthetic and philosophic subjects brought on him a charge of skepticism which was not removed by an epoch-making series of lectures, delivered before large audiences, and published under the title, 'The Main Literary Currents of the Nineteenth Century' (1872-82); for his description of the later intellectual position of Europe, as broken away from the orthodoxy and romanticism of the beginning of the century, brought on him the bitter attacks of all the reactionary forces in Denmark. His 'Danske Digtere,' a masterpiece

of psychological analysis, appeared in 1877; but the hostility of his enemies induced him in the same year to leave Denmark, and settle in Berlin, where he published, among other works, critical biographies of Lasalle (1877); Esaias Tegnér (1878); and Lord Beaconsfield (1879). Then a lecture tour through Norway and Denmark brought a powerful party to his side, and in 1882 he returned to Copenhagen, his countrymen having guaranteed him an income of \$1,000, with the one stipulation that he should deliver public lectures on literature. Among his later works are: 'Den Romantiske Skole i Frankrig' (1882); a biography of Ludvig Holberg (1885); a valuable study of Shakespeare, published in an English translation in 1899; 'Impressions of Russia' (1888); 'Poems' (1899); 'Berlin as an Imperial Court.' Brandes is not only the foremost critic of Denmark, but one of the great literary critics of his age. His works have been translated into German and also into English and French.

Branding, a form of punishment once in use for various crimes, but abolished in England in 1823. It was performed by means of a red-hot iron, and the part which was branded was the cheek, the hand, or some other part of the body. When the practice of arresting judgment in criminal cases by Benefit of Clergy was in force, it was customary to brand on the left thumb any layman who received this benefit, since it was not permitted to a layman to enjoy it more than once. Even after branding had been abolished in all other cases it was for a long time retained in the army as a punishment for desertion, the letter D being marked on the left side of a deserter two inches below the armpit. It was not, however, properly speaking, branded on his side, but marked with ink, gunpowder, or some other substance which would leave a stain that could not be obliterated without destroying the skin at the part. This also has been abolished. In mercantile law the term refers to the stamping of some distinguishing mark upon manufactured articles. (See **TRADE MARK**.) In cattle-raising districts in the United States, Australia, etc., cattle are branded with the mark of the owner.

Brandis, Christian August, German philologist and historian of ancient philosophy: b. Hildesheim, 13 Feb. 1790; d. Bonn, 24 July 1867. After a course of philological and philosophical studies at Kiel and Göttingen, he graduated from the University of Copenhagen in 1812, and for a short time delivered lectures on philosophy. He was induced by Niebuhr in 1816 to accompany him to Rome as secretary to the Prussian embassy. From 1819 to 1821 he was engaged in conjunction with Immanuel Bekker in collecting materials for a new edition of Aristotle, published in four volumes at Berlin (1831-6). In 1821 he was appointed ordinary professor of philosophy at Bonn, and his professional duties at this university were continued during the rest of his life, being only interrupted by a residence of three or four years in Greece, where he was acting as councillor to King Otho. After his return from Greece he published an interesting and instructive work, for which his residence in that country had furnished him with materials, entitled 'Mittheilungen über Griechenland' (Communications on Greece) (1842), and at

the same time resumed his professorship at Bonn. His two most important works are his 'Handbuch der Geschichte der Griech.-Röm. Philosophie' (1835-60); and 'Geschichte der Entwicklungen der Griech. Philosophie' (1862-4).

Brandon, Canada, a city in Manitoba on the right bank of the Assiniboine River, 132 m. west of Winnipeg, on the Canadian Pacific Railway. The name was given first in 1794 to Brandon House, a trading-post on the Assiniboine, 13 m. east of the present location, and also to the range of hills to the south. Brandon is the railway centre for a fertile farming country and is the second city in size and importance in the province. It stands on the gravelly slopes of the south bank of the river and has excellent sewerage and water systems. Both the business and residence portions are well-built. It has fine churches, schools and public buildings, Brandon College, a Baptist educational institution, and a general hospital. Its manufacturing industries include a large binder-twine factory, machine works, and woolen, flour and saw mills. Across the valley is the Manitoba Experimental Farm of 670 acres; and on the same side of the valley, the Indian Industrial School and one of the Provincial Asylums for the Insane.

Brandon, Vt., a township of Rutland County, 16 miles northwest of Rutland, on the Central Vt. R.R., near Otter Creek. It contains an academy, two parks, a fine hotel, marble quarries, flour mills, and manufactories of carriages, castings, paint, etc. Pop. (1910) 2,712.

Brandstetter, Hans, Austrian sculptor: b. Hitzendorf, near Graz, 25 Jan. 1854. He first studied wood-carving in Graz and later went to the Academy at Vienna where he was a pupil of Hellmers. His three earliest works won the prize given by the Academy; these are 'Lot's Flight from Sodom,' 'The Flute-player,' and 'Plato.' Among his other works may be mentioned his bronze 'Forest Lily,' 'Prometheus,' 'The Return of the Prodigal Son,' and the busts of Hamerling and Rosegger.

Brandt, Carl Ludwig, kárl lood'víg bránt, German-American painter: b. near Hamburg, Germany, 22 Sept. 1831; d. Savannah, Ga., 19 Jan. 1905. He studied art in European art galleries, came to the United States in 1852, and thereafter painted portraits and historical scenes. He became a member of the National Academy in 1872, and was a director of the Telfair Academy of Arts and Sciences at Savannah, Ga.

Brandt, Gerhard, Dutch Arminian clergyman: b. Amsterdam, 1626; d. there, 1685. After completing his studies and making himself a thorough Hebrew and Greek scholar, he became pastor of the Remonstrants, first at Nieukoop and afterward at Amsterdam. His works, almost all written in Dutch, include a 'Life of Admiral Michel Ruyter,' which has been translated into French; a 'Narrative of the Trial of Barneveld, Hoogerbeets, and Grotius'; and a 'History of the Reformation.' The last work, on which his fame chiefly rests, has been translated into English. It is remarkable for the elegance of its style, but written too much in the spirit of partisanship.

Brandt, Hermann Carl George, German-American educator: b. Vilsen, Germany, 15 Dec. 1850. He graduated from Hamilton College,

BRANDT—BRANDYWINE CREEK

Clinton, N. Y., in 1872; was instructor there (1874-6), associate professor of German at Johns Hopkins University (1876-82); and since 1883 professor of German at Hamilton. He has published a 'German-English and English-German Dictionary' (1879); 'German Grammar' (1884); a 'German Reader' (1889); and an edition of Lessing's 'Nathan der Weise.'

Brandt, Josef von, Polish painter: b. Szczebrzeszyn, 11 Feb. 1841. He first studied engineering at Paris, then took up painting at Munich as a pupil of Franz Adam and Karl Piloty and opened his own studio. His pictures mostly illustrate the soldier life of the 17th century, though he has painted also some excellent pictures of Polish peasant life. His works include 'Polish Peasants at the Inn,' 'Episode of the Thirty Years' War,' 'The Battle with the Turks near Vienna, 12 Sept. 1683,' 'Cossack Camp,' 'Tartar Battle,' 'Cossacks on the March,' 'Cossacks' Triumphal Song,' and 'Defense of a Farmyard by Polish Cavalry.'

Brandt, Marianne (family name, **MARIE BISCHOF**), German opera singer: b. Vienna, 12 Sept. 1842. She received her education at the Vienna Conservatory and won her first success on the stage as *Recha* in 'The Jewess.' She was at Gratz for a short engagement, and in 1868-82 was connected with the Royal Opera in Berlin; in 1876 and 1882 she assisted at the Wagner musical festivals at Bayreuth. After 1882 she made a number of tours and sang at the German Opera in New York for several seasons. She ranks very high both as a singer and an actress, her voice being a contralto.

Brandt, Max August Scipio von, German diplomatist: b. Berlin, 8 Oct. 1835. He served for a short time in the army, but was sent on diplomatic business to the East in 1860 and was resident in Japan as German diplomatic representative (1862-75). From 1875 to 1893 he was German minister at Peking. He has published 'Aus dem Lande des Zopfes' (1894); 'Die Zukunft Ostasiens' (1895); 'Sittenbilder aus China' (1895).

Brandt, Nicholas, German chemist of the 17th century, usually considered the discoverer of phosphorus. Leibnitz mentions him as a chemist of Hamburg, who, during a course of experiments on urine, for the purpose of discovering a solvent which would convert silver into gold, accidentally produced phosphorus, in 1667 or 1669. He communicated or sold his discovery to Kunkel, who showed it to Leibnitz. Boyle, securing a piece of the phosphorus, and knowing from what material it had been obtained, after various experiments succeeded in preparing it, and thus made an independent discovery of the method.

Brandy, the name most commonly applied to the spirit distilled from the juice of the grape, but also given to liquors distilled from other fruits, such as apples, cherries, peaches, etc. All these brandies differ from each other only in the essential oil which they contain, and which gives to each its different flavor and aroma. The alcohol in brandy generally constitutes 50 per cent of the whole, the remaining substances being water, amyl, propyl, and isobutyl, alcohols, glycerol, etc. The aroma is due to cenanthic ether and some volatile oils. A brandy highly esteemed is that of Cognac, exported from southwestern France, and obtained by distilling white

wines of the finest quality. An inferior kind of spirit is frequently prepared from the "marc" of grapes and the refuse of wine vats. When first distilled it is as colorless as alcohol, and continues so if kept in bottles or jars. When stored in casks, however, it acquires from the wood a pale amber tint, and in this state is sold as pale brandy. The dark color of brown brandy is produced artificially, to please the public taste, by means of a solution of caramel, and this is frequently added in excess to give a rich appearance to a brandy of low quality. A large proportion of the brandy sold in the United States is simply raw grain spirits flavored and colored. The spirit is imported into France, where it is redistilled and converted into French brandy. Brandy improves in flavor by being kept, but loses in strength. Genuine Cognac brandy has always been both costly and difficult to obtain in this country (the more so on account of the high import tariff collected thereon), the price for the liquor reaching \$20 or more per gallon. Of late years the development of viticulture in the western States, particularly in California, has enabled American enterprise to produce a brandy that is everywhere a formidable rival to the French article, and for purity and excellence infinitely preferable to the compounded and doctored spirit for which we have been accustomed to pay so high a price. Genuine brandy consists of alcohol and water, with small quantities of cenanthic ether, acetic ether, and other volatile bodies produced in the process of fermentation. The value of brandy as a medicine depends on the presence of these ethers and other volatile products; when, therefore, it is adulterated with raw grain spirit and water, the amount of these ethers is so reduced that the brandy becomes almost valueless for medical purposes. Imitation brandy is prepared either by flavoring highly rectified spirit with essence of Cognac or by distilling the spirit with bruised prunes, acetic ether, argol, and a little genuine brandy, and adding to the distilled spirit tincture of catechu and spirit coloring. This is said to be greatly improved by keeping. See **ALCOHOL**; **BEVERAGES**; **DISTILLED LIQUORS**.

Brandy Station, Va., a village of Culpeper County, southwest of Alexandria, notable as the scene of several minor battles during the Civil War. The earliest, on 20 Aug. 1862, was distinguished by a fierce cavalry charge on the Federal side; the second, 9 June 1863, resulted in the defeat of the Federal cavalry under Gens. Buford and Pleasanton by the Confederate commander Stuart. See **FLEETWOOD**, or **BRANDY STATION, BATTLE OF**. Other battles were fought near here, 13 Sept. 1863; 11 Oct. 1863; and there were also several skirmishes here.

Brandywine Creek, a small river of Pennsylvania and Delaware, formed of two forks, the east and west, which effect a junction in Chester County of the first named State, and, taking a southeasterly course, empties into Christiana Creek two miles below Wilmington. At Chadd's Ford on the Brandywine, 11 Sept. 1777, was fought a severe battle between the British and German troops, 18,000 strong, under Howe, and the Americans, numbering 13,000 men, under Washington, in which the latter were defeated. The consequence of this battle was the occupation of Philadelphia by the British troops.

BRANFORD — BRANT

Branford, Conn., a borough of New Haven County, situated on Long Island Sound, and on the New York, N. H. & H. R.R., about seven miles southeast of New Haven. The harbor admits small vessels. The oyster-beds of Branford form an important industrial feature. Among other occupations are the quarrying of granite, and the manufacture of locks and iron-fittings. The Blackstone Memorial Library, one of the most notable of the smaller American public library buildings, is located here. The place was settled in 1643, and in 1667 a large number of the inhabitants removed to New Jersey, settling at Newark. Branford was named for Brentford, England, and was incorporated in 1893. Pop. (1910) township, 6,047; borough, 2,560.

Brangwaine, the name of the nurse of Yseult in the legend of Tristan. The name appears as Brangäne in Wagner's opera, 'Tristan and Isolde.'

Branicki, Jan Klemens, yān klā'měnz brānits'kē, Polish statesman: b. 1688; d. 9 Oct. 1771. In his youth he served in the French army. In 1715 he returned to Poland. He rose to the highest dignities, was an opponent of Augustus II., and the zealous champion of the nobility. After the death of Augustus III., he officiated as great constable and first senator of the kingdom, and stood at the head of the Republican party, but defended the privileges of the nobility. He was offered the crown by a great majority of the nobles who constituted the nation. But the party of the Czartoryskis, backed by Russia, was triumphant. Poniatowski was elected, and Branicki was outlawed and escaped to Hungary. As his wife was a sister of the new king, he soon returned and recovered his dignities. He was called by the nation the last patriot, and at his funeral was performed for the last time the mediæval ceremony of the ancient chivalry, that of breaking the coat of arms, and entombing it with the body of the last member of a noble line.

Brank, an instrument formerly in use for the punishment of scolds. It consisted of an iron frame which went over the head of the offender like a common horse-bridle, and had in front an iron plate, which was inserted in the mouth, where it was fixed above the tongue and kept it perfectly quiet. Such instruments are still preserved in the Ashmolean Museum, Oxford, the National Museum of Antiquities at Edinburgh, and in other museums, municipal buildings, and churches in England and Scotland.

Bran'nan, John Milton, American soldier: b. Washington, D. C., 1819; d. New York, 17 Dec. 1892. He graduated at the United States Military Academy in 1841, and entered the 1st Artillery. During the Mexican war he took part in the battles of Cerro Gordo, Contreras, and Churubusco, and in the siege of Vera Cruz and the capture of the city of Mexico, where he was severely wounded. He was brevetted captain for gallant and meritorious conduct at Contreras and Churubusco. He served against the hostile Seminoles in Florida, and at the outbreak of the Civil War commanded the forces engaged in the reduction of the Confederate works on St. John's River, compelling the evacuation of Jacksonville. He commanded a

division in the Army of the Cumberland 1863-4, taking part in the advance on Tullahoma, served through the Atlanta campaign and all its operations, and was in the battles of Hoover's Gap, Chickamauga, Missionary Ridge, Kenesaw Mountain, and the siege of Atlanta. On 13 March 1865 he was brevetted major-general of volunteers for gallant and meritorious services during the War. He was stationed at various posts from 1866 until his retirement, 19 April 1882, as colonel of the 4th Artillery.

Bran'net, John Caspar, American geologist: b. New Market, Tenn., 4 July 1850. He graduated at Cornell University in 1882, and in 1885 took his degree of Ph.D. at the University of Indiana. He was assistant geologist of the Imperial Geological Survey of Brazil 1875-8; special botanist for Thomas A. Edison in South America 1880-1; special agent of the United States Department of Agriculture for investigating cotton and the insects affecting it in Brazil 1882-3; topographical geologist of the Pennsylvania geological survey, anthracite district 1883-5; professor of geology at the University of Indiana 1885-91; State geologist of Arkansas 1887-92. In 1892 he was elected professor of geology at Leland Stanford Jr. University, and since 1899 has been its vice-president. He has written a large number of papers and reports on geology and physical geography, and is associate editor of the 'Journal of Geology.'

Brannon, Henry, American jurist: b. Winchester, Va., 26 Nov. 1837. He studied law and practised his profession in West Virginia 1859-81, becoming circuit judge in 1880, and judge of the State supreme court in 1888. He has published 'Treatise On Rights and Privileges Under 14th Amendment to the Constitution of the United States.'

Brant, Joseph (THAYENDANEGEA), Mohawk chief: b. Ohio, about 1742; d. 24 Nov. 1807. He was sent by Sir William Johnson to a school at Lebanon, Conn., from which grew Dartmouth College. Joining the Episcopal Church he taught religion to the Mohawk Indians, translating into their language parts of the New Testament and the Prayer Book. His services against Pontiac and in the French and Indian war were highly valued. After Sir William Johnson's death, he became, in 1774, secretary to George Johnson, superintendent of Indian affairs, and when the American Revolution began he incited the Indians against the colonies. His presence at the massacre of Wyoming is authoritatively disproved, but he took part in that of Cherry Valley, and in other savage engagements. He was received with great distinction on his tour to England in 1786, and was attached to the military service of Sir Guy Carleton in Canada. He opposed the confederation of the Indians which led to the expedition of Gen. Wayne, and did all he could to prevent peace between the Indians and the United States. He was zealously devoted to the welfare of his own people, a brave warrior, and noted for his ability. In England he collected funds with which he built the first Episcopal Church in Upper Canada. One of his sons, in the War of 1812, was the leader of a body of Canadians and Indians against the United States. The life of Brant has been written by Col. W. L. Stone of New York.

BRANT — BRASENOSE

Brant, brânt, or Brandt, Sebastian, German poet: b. Strassburg, 1458; d. there, 10 May 1521. He studied law at Basel, took the doctor's degree, and delivered lectures on jurisprudence for many years. In 1501 he was state councilor at Strassburg, and state recorder in 1503. Some of his writings brought him to the notice of Emperor Maximilian, who entrusted him with several important commissions in the interests of the state. He translated Virgil, Terence, and other Latin writers, and wrote a number of law treatises as well as poetry. The work which brought him fame is a poem called 'The Ship of Fools,' first published in Basel 1494, in which he satirizes the vices and follies of his age. This became immediately popular; four editions appeared in one year, and it was translated into Low German, Latin, French, and English. In Germany it was so esteemed that the celebrated preacher Geiler of Kaisersburg delivered public lectures on it from the pulpit at Strassburg. Later editions have been printed, of which the best are by Zarncke (1854), and by Goedecke (1872). The English translations are by Alexander Barclay (1509), and by Henry Watson, the latter reprinted in 1874.

Brant, a small wild goose of the genus *Branta*. The most familiar species, the "common brant" (*Branta bernicla*) is found widely distributed throughout the United States. Its plumage, chin, and cheeks are glossy black, fading into gray at the sides, with its under parts entirely white, and white streaks on the sides of the neck. In its markings it is distinguished from the "black brant" (*Branta nigricans*) of the Pacific coast, which is entirely black underneath. Brants generally travel in flocks, and their comparative sluggishness enables the gunner to procure a larger number in the short time they are present, than of any other sort of goose. They feed on vegetable matter, their chief food consisting of the "eel-grass," for which they dive at low tide. The brant is chiefly a marine bird, rarely seen in the interior of the United States, and breeds in the far North, well within the Arctic Circle. Its nest is made on the ground from grass, mosses, etc., and its four eggs are dirty white in color. The name is sometimes given to other species of goose, as for instance the "snow goose" (q.v.) is sometimes termed "white brant" because of its similarity in size. See GESE.

Brant-bird, or Beach-robin, common names among American gunners for the shore-bird (*Streptopelia interpres*), called "turnstone" by British sportsmen and in most books, because of its habit of moving aside pebbles in order to get at the beach-fleas and other small creatures hiding beneath them, upon which it feeds. It also makes a special food upon our shores of the eggs of the "horsefoot," or king crab, which it scratches out of the sand; hence it is known to some as "horsefoot snipe." It stands between the plovers and sandpipers, having a comparatively short bill and legs, and less active manners than most of the latter. It is, perhaps, the most beautiful of the beachbirds, having a highly variegated plumage much alike in both sexes. The bill is black; feet orange; head and sides of neck black and white, with a black band across the breast; throat, lower parts and tail coverts, white; remainder of the plumage chestnut and brown, mottled with black

and set off by a white band on the wing. This is one of the most cosmopolitan of birds, wandering to all parts of the world, yet nowhere, perhaps, numerous.

Brantford, Canada, city, port of entry, and county-seat of Brant County, Ontario; on the Grand River, at the junction of several branches of the Grand Trunk Railway, 70 m. southwest of Toronto and 60 m. east of London. It is named from the Mohawk chief, Joseph Brant (q.v.), to whom a fine monument, a colossal statue, was unveiled in Victoria Square, 13 Oct. 1886. The Grand River is navigable to within about two miles of the city, and is connected therewith by a canal, affording water communication with Lake Erie. A United States consular agent is stationed here. The city is lighted by electricity, and has handsome churches, schools, and private buildings, a stone courthouse, hospital, house of refuge, etc. It is the seat of the Ontario Institution for the Education of the Blind and of Wickliffe Hall. Brantford is the trade centre of a large and fertile agricultural region; has branches of all the principal banks; and daily and weekly newspapers. The buildings and shops of the Grand Trunk Railway occupy more than 12 acres. The manufactures comprise metal and stoneware, engines, machinery, sash and blinds, agricultural implements, etc. Pop. about 17,500.

Brantôme, Pierre de Bourdeille, pê-âr dé boor-dâ-ê brân-tôm, (LORD OF THE ABBEY OF BRANTÔME): b. Périgord, Gascony, about 1540; d. 1614. In his epitaph, composed by himself, he relates in a vaunting manner how he first bore arms under the great Francis of Guise, and afterward served the king, his master. At an early age he received the abbey of Brantôme, but his life was mostly spent in war and gallantry. After the death of Charles IX. he withdrew to his estates and wrote his memoirs, which have a great deal of vanity and self-complacency, mingled with much that is interesting. Brantôme was personally acquainted with the great characters of the time, and an eye-witness of all the important events which then took place, and in some was an actor. He was a courtier, regardless of right or wrong; who does not blame the great, but observes and relates their faults and crimes as ingenuously as if he were uncertain whether they deserve praise or blame; as indifferent about honor and chastity in women as about integrity in men. He places us in the middle of that century when expiring chivalry was contending with the forming and as yet unsettled manners of later times. Brantôme, in the midst of his wandering life, had acquired more learning than most of his fellow soldiers. He has left 'Vies des grands Capitaines Français'; 'Vies des grands Capitaines Etrangers'; 'Vies des Dames Illustres'; and 'Vies des Dames Galantes' (together called 'Recueil des Dames'); besides other works.

Brase'nose, one of the colleges of Oxford University, founded by William Smith, bishop of Lincoln, and Sir Richard Sutton, in 1509. The origin of the name is unknown, farther than that it was transferred to the college from the previously existing Brasenose Hall. Anthony à Wood states that Brasenose Hall had as its sign a nose of brass, being probably a

BRASHEAR CITY — BRASS

knocker. The college is very rich in endowments, which, however, have suffered owing to the decreased revenue from land.

Brashear (brăsh'ér) City. See MORGAN CITY.

Brash'er, Abraham, American army officer: b. New York, 22 Dec. 1734; died in exile during the revolution, in 1782. He was one of the most active associates of the "liberty boys" of his native city. He wrote many of the popular ballads of the revolutionary period, and was a constant contributor to the newspapers of his day. Among his poetical productions were 'Another New Year's Address,' and the 'General's Trips to Morristown,' both of which were favorites in the American camp.

Brasidas, Spartan general who distinguished himself in the first half of the Peloponnesian war by his courage and his military skill: d. 422 B. C. He first distinguished himself by repelling the attack of the Athenians on the fortress of Methone (431 B.C.). In 429 he was sent to assist Cnemus and participated in the unsuccessful attack on the Piræus; in 427 accompanied the admiral Alcidas to Corcyra; in 425 was severely wounded in the assault on Pylos; and subsequently was elected by his fellow-countrymen to be the leader of an expedition intended to carry the war into Thrace. In 424 he relieved Megara, and passing through Thessaly effected a junction with Perdiccas of Macedon. Within a short time he had gained possession of Arrhibæus, Acanthus, Stagira, Amphipolis, Tŕone, and Scione. In 423 a truce was agreed upon, and in the same year Mende revolted and Brasidas immediately seized the town. The Athenians had, however, sent a new armament into the field consisting of two armies, and Brasidas, receiving no reinforcements from Sparta, was later forced to surrender the town to one of these armies. Cleon, the leader of the second army, allowed himself to be drawn into a battle at Amphipolis, and was totally defeated, he himself being in the number of the slain. But the Spartan victory was purchased with the loss of their general, who received a fatal wound during the engagement. Brasidas was buried at Amphipolis, within the walls, and long after his death his memory was honored as that of a hero, by the celebration of yearly sacrifices and games. The Greek writers speak highly of Brasidas. Thucydides notices his eloquence, unusual in a Spartan, his justice, liberality, and wisdom, while Plato compares him to Achilles; but circumstances are not wanting to show that he was endowed with as much Spartan duplicity as Spartan courage.

Brass, Sally, in Dickens' 'Old Curiosity Shop,' an evil and cruel woman who was her brother's law partner and assisted him in carrying out his schemes.

Brass, Sampson, in Dickens' 'Old Curiosity Shop,' an attorney of evil reputation, whom Quilp uses as a tool.

Brass. The quality of brass depends upon the proportions of its two constituents, copper and zinc. The greater the quantity of zinc the lighter the color and the more brittle and springy the alloy; while on the other hand, the greater the quantity of copper, the redder the

color and the tougher but softer the alloy. Technically, the term brass is extended to include compounds of copper and tin, as in *brass ordnance*, the *brasses* or bearings of machinery, etc.; but such alloys of copper and tin, though styled *hard brass*, are more strictly varieties of bronze. *Brass foil*, frequently not more than 1-50,000 of an inch in thickness and known as *Dutch leaf*, is made by beating out sheets of very thin brass containing a large proportion of copper. Copper and zinc alloys resembling brass are well known in the trade as *gilding metal*, *mannheim gold*, *pinchbeck*, *bath metal*, *Bristol brass*, *Muntz sheathing metal*, *spelter solder*, and *mosaic gold*.

In the manufacture of brass, either of two processes may be followed. The direct method is to fuse the zinc in a crucible and gradually add the copper in pieces. But this process is attended with disadvantage, owing to the volatile and oxidizable nature of zinc. The direct method of forming brass is generally followed; it consists in heating in crucibles or pots a mixture of calamine (carbonate of zinc), charcoal, and thin pieces of scrap or grain copper. For ordinary purposes brass is first cast into plates of about 100 pounds weight ($\frac{1}{4}$ to $\frac{1}{2}$ inch thick) which can be readily broken up, remelted, and cast in a mold of any desirable shape or size.

The following are the usual proportions in the several varieties of brass: Red brass—4 parts copper to 1 part zinc; Yellow brass—2 parts copper to 1 part zinc; Muntz metal—3 parts copper to 2 parts zinc; Spelter solder—1 part copper to 1 part zinc. For brass wire the mixture generally used is five parts copper to three parts zinc, but the proportions vary greatly, according to the purpose for which the wire is to be used. For some purposes, such as the manufacture of pins, where rigidity is of more importance than toughness, and cheapness is essential, it is possible to use Muntz metal; while for drawing into very fine gauges and weaving into the gauze that is used largely in paper-making machinery, much richer grades are employed.

The alloying of copper and spelter is performed in crucibles, generally made 16 inches in depth and 10 inches in diameter at the top tapering to about 9 inches in diameter at the bottom, the thickness of the walls being about 1 inch. These crucibles are heated in "wind furnaces." This furnace is fired with solid fuel and has a natural draft, the height of the chimney stacks varying from 40 feet, where each furnace has its separate stack, to 150 feet where a number of furnaces are connected to one stack. Gas furnaces are also used in combination with generators, in which case producer gas, or sometimes water gas is burned in place of the solid fuel; in these it is usual to heat 10 or 12 crucibles in one furnace or chamber. Reverberatory and tilting furnaces are employed for large castings in sand molds, but for casting ingots in metal molds it is usual to employ a crucible furnace of the "wind furnace" type, the fuel commonly used being coke. Tilting furnaces are largely used in America. The oldest method of making brass, still largely used, is as follows: The metal is cast into long narrow ingots of about 1 cwt. each, and from 3 to 4 inches wide. The molds are generally

BRASSARTS — BRASSES

made of cast iron, cast in halves, which are clamped together with wrought-iron rings. The molds are placed below the surface of the floor of the casting shop, and are supported against the side of the pit at an angle of about 60 degrees. Boards are placed across for the caster to stand upon while pouring the metal from the crucible into the mold. The metal, after careful skimming, is poured into the mold at the top, and when it has set the rings are slipped off the mold and the upper half removed, leaving the casting or ingot exposed. Before the metal is poured into the mold the inside of the mold is well brushed and dressed with resin and cotton-seed oil to prevent adhesion, or carbon in a fine state and whale oil are used, which give the mold an even surface. The ingots are next rolled when cold between ordinary flat rolls until the desired thickness is obtained.

The best process of *slitting* commonly employed in America, for grades of brass which can only be rolled cold, consists of casting the brass in the form of long bars, either square or round, from $1\frac{1}{4}$ to $1\frac{1}{2}$ inches thick. Each of these bars is rolled down separately in the cold state into a rod about $\frac{3}{8}$ inch in diameter, or sometimes less, which is afterward drawn into wire. Pieces weighing from 60 lbs. to 70 lbs. can thus be obtained. The advantage of this process over the old one is that longer lengths are obtained, and labor in the drawing is to some extent saved. A process brought out some years ago in the north of England consisted in casting in a centrifugal mold about 18 inches in diameter, and mounted on a vertical axis revolving at a high speed, so as to produce a casting in the form of a hoop. This was rolled down in open-ended rolls brought together with hydraulic pressure, and working in the same manner as those used for rolling out the tires for locomotives and other railway stock. A large thin hoop about 3 inches wide resulted, which was then cut in circular shears helically, forming a long strip, and this was drawn in the usual way. The great advantage of this method lay in the fact that a heavy piece was obtained, at the same time having a small section ready for drawing. In France a method often employed of making the "slittings" is to roll the metal down into large sheets, which are cut into strips spirally. Another method tried in America consists in casting a solid billet, which is pierced with a suitably constructed mandril to form a cylinder, which is afterwards cut up helically and drawn in the usual way.

In recent years continuous drawing machines have come very much into use. With these machines, instead of winding the wire on to a block, after drawing through one die at a time, the wire is drawn through one die, then wound two or three times round a block, and taken through another die, and so on, the friction on each drum being sufficient to carry the wire forward, and the circumferential speed of the drums being varied to suit the elongation of the wire. Owing, however, to brass being very quickly hardened by drawing, it is not possible to carry on this process *ad infinitum*, unless the wire be annealed periodically. When once it has been annealed it is possible to effect a very large reduction at one draught, the actual amount varying with the composition of the brass, the larger the proportion of copper the

greater the reduction at one draught. (See BRASS AND COPPER INDUSTRY).

The following table shows the weight in pounds of sheet brass of various thicknesses:

Thickness in inches	Weight of sheets per square foot	Thickness in inches	Weight of sheets per square foot
$\frac{1}{16}$	2.7	$\frac{1}{8}$	45.95
$\frac{1}{8}$	5.41	$\frac{3}{16}$	48.69
$\frac{3}{16}$	8.12	$\frac{1}{4}$	51.4
$\frac{1}{4}$	10.76	$\frac{5}{16}$	54.18
$\frac{5}{16}$	13.48	$\frac{3}{8}$	56.85
$\frac{3}{8}$	16.25	$\frac{7}{16}$	59.55
$\frac{7}{16}$	19.	$\frac{1}{2}$	62.25
$\frac{1}{2}$	21.65		65.
$\frac{9}{16}$	24.3		67.75
$\frac{5}{8}$	27.12		70.35
$\frac{11}{16}$	29.77		73.
$\frac{3}{4}$	32.46		75.86
$\frac{13}{16}$	35.18		78.55
$\frac{7}{8}$	37.85		81.25
$\frac{15}{16}$	40.55		84.
1	43.20	2	86.75

Bras'sarts, or Brassards, jointed plates of steel, protecting the upper arm, from the shoulders, which were covered by poldrons, to the elbows, where they were met by the gauntlets. These pieces of armor were not used in the chivalric ages, or in full suits of knightly armor, but in the half armor worn during the wars of Gustavus Adolphus, Wallenstein, and the Low Countries, in the times of Cromwell, when plate armor was going out of use.

Brasses, Monumental or Sepulchral, plates of brass, or of a mixed metal resembling brass, called *laton*, or *latten*, used as memorials of the dead. They were often made of life size and were cut to the shape of the figure, the details of armor, costume, features, etc., being worked out in incised lines from an eighth to a quarter of an inch in depth. Others, again, are found of much smaller dimensions, and rectangular in form, bearing in miniature the effigies of several figures. Such a plate of the 16th century, in the abbey church of Whalley, Lancashire, England, shows in the middle foreground the effigy of a knight in plate armor, kneeling with his hands clasped as if in prayer, and opposite him, in a similar devotional attitude, that of his wife; while behind the father range the kneeling figures of several sons, distinguished by their costumes as soldiers, priests, etc., and behind the mother a similar row of daughters, the family numbering in all some 20 persons. Underneath is an inscription recording the names of the knight and his wife, with dates, and a statement that he had built the chantry in which the plate was placed. Such brasses are often found affixed to the walls of a church, but it is sometimes uncertain whether they were so placed originally, many plates having been removed in the course of restorations.

The larger outline figures are usually found riveted or leaded into slabs of stone which form part of the church floor, the shallow depressions which hold the plate being cut to the figure. Such an one is the brass of Sir Roger de Trumpington, in Trumpington Church, near Cambridge, England, here shown. It is an excellent and well-preserved delineation of the armor of its day. The date of death is 1289, and this is believed to be the second oldest monumental brass in England; the older example being that of Sir John d'Aubernoun, in the church of Stoke d'Aubernoun, Surrey, bearing date 1277. The

BRASSEUR DE BOURBOURG

earliest brass of which there is any record in England is that of Simon de Beauchamp, of about the beginning of the 13th century; but



Brass of Sir Roger de Trumpington. Trumpington Church, Cambridge.

the figure is no longer in existence. The incised lines were sometimes filled in with a hard enamel, often of varying colors, though in most cases the enamel has disappeared. By the use of these colors it was possible to display the heraldic tinctures of the shield or tabard.

The art of engraving monumental brasses appears to have been introduced into England from the Continent, where it was much practised, and where some very fine specimens are to be found. (The ecclesiastical figure here shown is in a church at Bonn.) There are still a very large number of brasses in English churches, but empty hollows in stones bear witness to-day of the times of the Reformation, the civil wars, and the Puritans, when the hands of fanatics tore away these fine memorials as being "popish,"

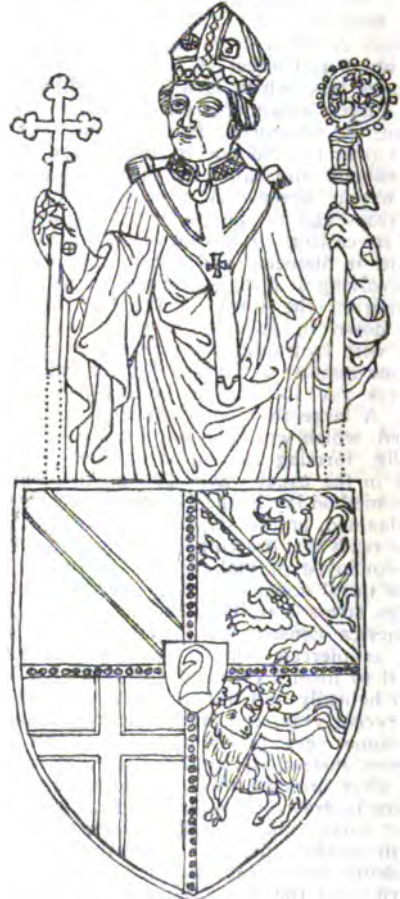
or those of soldiery reft them from their settings for purposes of gun-founding or revenge.

There are some handsome specimens of brasses mounted on altar-tombs. A fine instance is that of Robert Pursglove, suffragan bishop of Hull, England, in the chancel of St. Mary's Church, Tideswell, Derbyshire. The figure of the bishop is in full vestments, and a quaint inscription records his education by his uncle in Tideswell, and his subsequent career. It is a comparatively modern creation, however, of about the 16th or 17th century. A very handsome altar-tomb in the parish church of Skipton, Yorkshire, was designed by Sir Gilbert Scott,

after the more ancient models. On the top of the tomb are plates depicting a knight and lady of the Clifford family, and at the corners are the symbols of the four Evangelists. A brass fillet around the slab bears an inscription.

Some modern brasses are to be found, incised and enameled in colors with symbolic devices; but they lack the historic value and interest of the mediæval effigies, to which appeal has often been taken for the solution of some question of detail of costume, armor, or heraldry.

Information concerning monumental brasses may be found in Haines' 'Manual of Monumental Brasses'; The Oxford Architectural Society's 'Manual for the Study of Monumental Brasses'; Boutell's 'Monumental Brasses of England'; Waller's 'Series of Monumental Brasses from the 13th to the 16th Century'; Belcher's 'Kentish Brasses'; Creney's 'Monumental Brasses on the Continent'; Gough's 'Sepulchral Monuments'; Cotman's 'Suffolk Brasses'; Dugdale's 'Monasticon Anglicanum';



Brass of an Ecclesiastic, Bonn, Germany.

English county histories; and the publications of the Royal Societies of Antiquaries and of Archæologists.

Brasseur de Bourbourg, Charles Etienne, shârl â-tê-ên bra-sêr de boor-boor, French writer on American history, archæology, and

ethnology: b. 1814; d. 1874. He entered the priesthood, was sent to North America by the Propaganda, and lived and traveled here and in Central America for a number of years, partly in the performance of ecclesiastical functions. Among his works are 'Histoire du Canada'; 'Histoire des Nations civilisées du Mexique et de l'Amérique Centrale'; 'Gramatica de la Lengua Quiche'; 'Monuments anciens du Mexique'; 'Études sur le Système graphique et la Langue des Mayas.'

Brassey, Lady Anne, English descriptive writer: b. London, about 1840; d. 14 Sept. 1887. After her marriage she spent half of her life at sea on Lord Brassey's yacht, the Sunbeam. Her travels are interesting, popular, and have passed through many editions. They are 'Natural History of a Voyage on the Sunbeam'; 'Sunshine and Storm in the East'; 'Tahiti'; 'In the Trades, the Tropics, and the Roaring Forties,' and 'Three Voyages in the Sunbeam.'

Brassey, Thomas, English engineer and railroad contractor: b. Baerton, Cheshire, 7 Nov. 1805; d. Hastings, 8 Dec. 1870. After receiving an ordinary education he was, at the age of 16 years, apprenticed to a surveyor, whom he succeeded in business. After building parts of the Grand Junction and the London and Southampton railways, he contracted, in 1840, in partnership with another, to build the railway from Paris to Rouen. In a few years he held under contract, in England and France, some 10 railways, involving a capital of \$180,000,000, and employing 75,000 men. In partnership with Betts and Peto he undertook the Grand Trunk of Canada, 1,700 miles in length, including the great bridge at Montreal. His army of men were employed in nearly every part of Europe, South America, Australia, India, etc. He amassed great wealth, but continued to be generous to the needy, and modest and simple in his tastes and manners. Sir Arthur Helps wrote his 'Life' (1872).

Brassey, Sir Thomas, English politician, first Baron Brassey, son of Thomas Brassey (q.v.): b. Stafford, 11 Feb. 1836. He was educated at Rugby and University College, Oxford, and entered Parliament for Devonshire in 1865, subsequently sitting for Hastings 1868-86. He served as civil lord of the admiralty 1880-4, and was secretary to the admiralty in 1884-5. In 1886 he was elevated to the peerage as Baron Brassey. From 1895 to 1900 he was governor of Victoria. He has published 'Work and Wages' (1872); 'The British Navy' (1882-3); 'Lectures on the Labor Question' (1878).

Brattleboro, brát't'l-bür-ō, Vt., a town in Windham County on the Connecticut River in the southeastern part of the State, on the Boston & M., and Central Vermont R.R.'s. The town was first settled in 1724 at Fort Dummer by a garrison from Massachusetts. The settlement at Fort Dummer was the first permanent civilized settlement in Vermont. The town was chartered in 1753 and incorporated as a village in 1832. Its present form of government is by a board of three selectmen elected annually in March and five village bailiffs elected annually in May. The town is situated in a picturesque rich farming region, is the trade centre of south-

east Vermont and contains the State Asylum for the Insane, Brooks Public Library and has many fine churches, Brattleboro Academy and an excellent system of high and graded schools. The city has 4 banks, 2 national with a capital of \$550,000; deposits \$1,500,000; 2 savings, deposit \$4,500,000, surplus \$450,000. Brattleboro has many manufactures, chief of which is the factory of the Estey Organ Company. Pop. (1910) 7,541.

O. L. FRENCH,

Editor 'Vermont Phoenix.'

Braun, August Emil, ow'goost ä'mël brown, German archæologist and writer on art: b. Gotha, 19 Aug. 1809; d. 12 Sept. 1856. He received his early education at his native town, and continued his studies at Göttingen. From 1832 to 1833 he resided at Dresden, whence he went to Rome in company with Gerhard, with whom he had formed a close intimacy. In the same year he was appointed first librarian and then assistant secretary to the Archæological Institute, and in 1834 became editor of the 'Bulletin,' and in 1837 of the 'Annali' of that institution. His chief works are: 'The Judgment of Paris'; 'The Artistic Representations of the Winged Bacchus'; 'Ancient Works in Marble' 1st and 2d decades; 'The Greek Doctrine of the Gods'; 'The School of Art Mythology,' with 100 copperplate engravings, translated into English by Grant; 'The Ruins and Museums of Rome,' constituting an excellent guide-book for artists and antiquaries.

Braun, Kaspar, German wood-engraver: b. Aschaffenburg, 1807; d. Munich, 29 Oct. 1877. He studied engraving in Munich and in Paris under Prévère. In Munich he founded, with Dessauer, a xylographic institute, which later became a school of engraving. In 1843 he, in association with Friedrich Schneider, founded the 'Fliegende Blätter.' The chief works which Braun has illustrated are 'Die Nibelungenlied'; the 'Volskalkender'; 'Götz von Berlichingen'; and 'Münchener Bilderbogen.'

Braun, Ludwig, German painter: b. Schwäbisch Hall, 23 Sept. 1836. He was educated at Munich and Paris, and a number of water colors of the Schleswig-Holstein war were the means of obtaining him a contract to paint a cycle of pictures illustrating the history of the family of the Count of Hunolstein. His favorite subjects are battle scenes, and he accompanied the Austrian army in the Danish war and the Germans in the Franco-Prussian war. Among his works are 'The Capitulation of Sedan'; 'The Entry of the German Army Into Paris'; and 'The Germans in Versailles.' He has also painted several very successful panoramas, including 'The Battle of Sedan'; 'The Battle of Mars-la-Tour'; and the 'Battle of Lützen.'

Braunsberg, browns'bërk, Prussia, a town in the province of eastern Prussia, and government of Königsberg, on the Passarge, about four miles from its junction with the Frische Haff. It is the residence of the bishop of Ermeland, and has a Roman Catholic Lyceum, a gymnasium, a seminary for priests, a normal school; and manufactures of linen, woollens, and leather; and a good trade.

Brauro'nia, (1) a name sometimes given to the Greek goddess, Artemis, from her shrine at Brauron, Attica; (2) a Greek festival in

honor of Artemis held every four years at Brauron, in which every Attic woman must take part before she could marry. The rites were performed by girls from 5 to 10 years old, and a part of the ceremony consisted in their imitation of the actions of bears.

Brauer, brow'ér, or Brouwer, Adrian, Dutch painter: b. Haarlem, or Oudenarde in East Flanders, 1608; d. Antwerp, 1640. He made designs of flowers and birds, which were stitched upon caps and bonnets sold by his mother, a poor woman, to the peasants. Francis Hals, a distinguished painter of Haarlem, happening to see some of these, was so struck by the talent which they evinced that he invited the young artist to receive instructions at his house, where he kept him hard at work in a garret, and appropriated to himself the proceeds of his pictures. Here Brauer remained for many months, ignorant of the estimation in which his talent was held abroad, until by the assistance of his fellow pupil, Adrian van Ostade, he was enabled to escape to Amsterdam. The discovery of the reputation he had acquired seems to have crushed rather than incited his ambition. Perceiving the prices which his pictures commanded, and his own facility in executing them, he yielded to a natural taste for gross pleasures, and painted only when it was necessary to procure money to indulge in dissipations. During the wars with Spain he started on a journey to Antwerp, but being unprovided with a passport he was imprisoned on suspicion of being a spy. The Duke d'Arenberg, a fellow prisoner, recognizing his talent, induced him to paint something. The subject was a group of soldiers playing at cards, which the artist sketched from his prison window, and the picture being shown to Rubens he at once pronounced it a work of Brauer, whose release he immediately procured, and whom, from admiration of his genius, he received as an inmate into his house. Brauer's longing for his old life, however, soon induced him to leave his protector, and after a brief career of reckless dissipation he died in the public hospital of Antwerp.

Bravi, brá'vè, the name formerly given in Italy, and particularly in Venice, to those who were ready to hire themselves out to perform any desperate undertaking. The word had the same signification in Spain, and both the word and the persons designated by it were found in France in the reign of Louis XIII. and during the minority of Louis XIV. At the end of the 15th century they are described as being armed to the teeth, with an arquebuse in their hands, a cutlass at their side, masked by a bushy beard and enormous moustaches, and wearing a long and thick forelock called a *ciuffo*, which they used to bring down over their face when they wished to conceal it entirely.

Bravo, Leonardo, lă-ô-năr-dô bră'vô, Mexican revolutionary patriot: b. near San Luis de Potosi, 1766; enlisted in the revolutionary cause, and died of prison fever, in the hands of the Spaniards, in the city of Mexico, in 1812. The Spanish commander had repeatedly offered him his liberty on condition of taking service in the royal army, but, though the fever caused by confinement in a filthy dungeon was wearing out his life, he steadily refused to save it on such conditions.

Bravo, bră'vô, Nicholas, Mexican statesman, son of Leonardo Bravo: b. Chilpanzingo, 1790; d. 22 April 1854. He participated in the revolution against Spain (1810-17), and later aided Iturbide in establishing a republic, and supported him until 18 May 1822, when Iturbide proclaimed himself emperor. To this step Bravo was opposed, and he contributed in no small degree to Iturbide's deposition. He again became a member of the provisional government which remained from 1 April 1822 till 10 Oct. 1824, when the federal constitution took effect, under which he was elected to be vice-president until 1 April 1829, Guadalupe Vittoria being president. The politics of Mexico had now become involved in a controversy in which the order of freemasons, divided into two parties, one known as the *Escoses* and the other as *Yorkinos*, contended at once for the Scotch and ancient York rituals, and the one for a centralized, and the other for a federal, form of government. Bravo was grand master of the Scotch division, and when the federal system prevailed he became a leader of the opposition. Notwithstanding this, he had been elected vice-president; but when, on 23 Dec. 1827, the standard of revolt was raised at Otaviba, he became the head of the movement. The purpose of the *pronunciamiento* was to replace the actual members of the executive government with men of the *Escoses*, and to dismiss Mr. Poinsett, then United States minister in Mexico, who was charged with too actively favoring the other party. Bravo was defeated and expelled, but was recalled in 1830 by President Bustamente, and sent by him against the insurgent Guerrero, who was taken in arms and executed by Bravo's orders, 14 Feb. 1833. After this Bravo remained in retirement until July 1839, when, as president of the council, he was charged with the supreme administration of the government during an interim of a week. Again from 26 Oct. 1842, till March 1843, he was substituted as president by Santa Anna, during his absence as dictator at the head of the army. For the last time he held executive power as temporary president from 29 July to 4 Aug. 1846, when he was deposed by a revolution. On the commencement of the war between Mexico and the United States, he took up arms in behalf of his country, and participated in the battle of Cerro Gordo. In the autumn of 1853 he was accused by the ministers of Santa Anna of having secretly joined Juan Alvarez in the insurrection he had set on foot; but he at once denied the accusation and declared that he had retired from public life forever.

Bra'vo, The, a novel by James Fenimore Cooper, is a tale of Venice in the 16th century, full of mystery and intrigue, and the high-sounding language which years ago was thought the natural utterance of romance. Don Camillo Monforte, a Paduan noble, has a right by inheritance to a place in the Venetian Senate. He becomes obnoxious to the Council, and a bravo is set on his track to kill him. He has fallen in love with Violetta, a young orphan heiress designed for the son of an important senator; and she consents to elope with him. A priest marries them, but by a trick she is separated from him and carried off. The Bravo, sick of his horrible trade, has refused to take a hand in the kidnaping of Violetta; and confesses to Don Camillo all he knows of it, promising to help

him recover his bride. Jacopo, the Bravo, finds her in prison and contrives her escape to her husband; but is himself denounced to the Council of Three, and pays for his treachery to them with his head. The romance is of an antiquated fashion; and has not the genuineness and personal force of Cooper's sea stories and 'Leatherstocking Tales,' which grew out of an honest love for his subjects.

Bravo-Murillo, Don Juan, dōn hoo-ān' brā'vō-moo-rē'lyō, Spanish statesman: b. Badajoz, June 1803; d. Madrid, 11 Jan. 1873. In 1825, he entered the College of Advocates at Seville, and showed great devotion to the monarchy. When the Progressistas came into power he went to Madrid, and founded a law magazine, the 'Boletín de Jurisprudencia.' In 1836, he became secretary of the Department of Justice under Señor Isturiz. In 1847 he became minister of Trade and Public Instruction, and, in 1849-50, of Finance. In 1851 he formed a cabinet, with himself as premier, but, in 1853, it was superseded by that of Gen. Lersundi. The oppressive measures adopted by Bravo-Murillo and his successors led to the revolution of 1854, and the attainment to power of Marshals Espartero and O'Donnell.

Bravura (brā-voo'ra) Air, an air so composed as to enable the singer to show her skill in execution by the addition of embellishments, striking cadences, etc. It is sometimes used for the style of execution.

Braxton, Carter, signer of the Declaration of Independence: b. Newington, King and Queen County, Virginia, 10 Sept. 1736; d. 10 Oct. 1797. He inherited several plantations, and passed the early part of his life in the enjoyment of his fortune in his native State, and in England, where he resided some years. In 1765 he took an active part in the eventful session of the house of burgesses of Virginia, in which the resolutions of Patrick Henry were adopted, and in the subsequent assemblies which were dissolved by the governor. He was next a member of the conventions which were the first step toward the substitution of popular for the royal government; and on 15 Dec. 1775, was elected delegate to the continental congress, as successor of Peyton Randolph, and as such affixed his name to the Declaration of Independence. He did not remain long in Congress, but served in the legislature of Virginia until 1786, when he became one of the executive council. The close of his life was embittered by pecuniary embarrassments, and the entire wreck of his fortune.

Brax'y, or Dysentery in Sheep, inflammation of the coats of the intestines. It is often preceded by diarrhoea, and attended by fever and constitutional disturbances. A sudden change of pasturage, more particularly from a succulent to a high and dry pasture, is one of the most frequent causes, and to this may be added exposure to wet and cold after traveling. It is a much more serious disease than simple diarrhoea, and often becomes fatal in the course of a few days. The name is also applied to a blood disease resulting from plethora, which is considered by some to be the true braxy. In this case also a sudden change of pasturage is the most frequent cause of the disease, but the change which generally produces it is the reverse of that which produces the

former, namely, a change from a low diet to rich and nourishing food. This disease is even more fatal than the former, and runs its course in a few hours. As there is no means of saving an animal which is once attacked, the only course is to avoid the causes which lead to the disease.

Bray, Anna Eliza, English woman of letters: b. London, 25 Dec. 1790; d. there, 21 Jan. 1883. Her maiden name was Kempe; she studied for the stage, but in 1818 was married to Charles A. Stothard, son of the famous artist, and, after his death, became the wife of the Rev. Edward A. Bray, vicar of Tavistock. From 1826 to 1874 she wrote a series of novels, one of which, 'The Talba, or the Moor of Portugal,' brought her the acquaintance of Southey. In 1884 they were collected in a 12-volume edition. She wrote the 'Life of Thomas Stothard' (1856), and many books of travels. Her letters addressed to Southey, on the superstitions and scenery of Tavistock, entitled 'The Borders of the Tamar and the Tavy' (1836; new ed. 1879), and 'A Peep at the Pixies; or, Legends of the West' (1854), are much esteemed. Mrs. Bray's 'Autobiography' appeared in 1884.

Bray, Sir Reginald, English architect: d. 1503. He was the second son of Sir Richard Bray, one of Henry VI.'s privy councilors, and stood high in the favor of Henry VII., for whom he is understood to have designed, if he did not actually execute, the beautiful chapel at Westminster which bears that monarch's name. Another of his works, and now his final resting-place, is the almost equally beautiful chapel of Saint George's at Windsor.

Bray, Thomas, English clergyman: b. Marton, Shropshire, 1656; d. London, 15 Feb. 1730. Having entered the ministry of the Established Church he founded in 1698 the Society for Promoting Christian Knowledge and in 1700 organized the Anglican Church in Maryland. In the following year he secured a charter for the Society for the Propagation of the Gospel in Foreign Parts. He was rector of Saint Botolph's, Aldgate, London, from 1706. He devised a system of lending libraries for parish purposes and in 1723 established the still existing society of Associates of Dr. Bray, which carries on his benevolent undertakings. He published a 'Directorium Missionarium' (1726); 'An Essay Toward Promoting All Necessary and Useful Knowledge' (1697), and several lesser works.

Bray, The Vicar of (SIMON ALEYN), incumbent of a small English parish near Maidenhead, Berkshire, from 1540 to 1588, during the reigns of Henry VIII., Edward VI., Mary, and Elizabeth. He kept his vicarage by changing his faith according to that of the state for the time being, becoming a Protestant with Henry, Catholic again in the reign of Mary, and Protestant again on the accession of Elizabeth. His principle was to live and die Vicar of Bray, and to it he adhered. The modern ballad, 'In Good King Charles' Golden Days,' makes the versatile vicar live in the reigns of Charles II., James II., William III., Anne, and George I. The parish is 23 miles west of London and has a population of 5,750.

Bray, a maritime town of Ireland, partly in county Dublin and partly in Wicklow, though

BRAYERA—BRAZIL

mainly in the latter, picturesquely situated on both banks of the Bray, which here forms the boundaries of these two counties, 12 miles southeast of Dublin. The town, which has been popularly designated "the Irish Brighton," has been much improved in recent years, new houses being built, and a broad esplanade formed. Pop. about 7,000.

Brayera, also known as *Cusso* or *Kousso*, a handsome ornamental tree of Abyssinia belonging to the rose family. Its scientific name is *Hagenia Abyssinica*. The leaflets number 6 to 12 to each leaf, and its stamens are in separate flowers from its pistils. The bunches of pistillate flowers, made into an infusion, are used in medicine for the expulsion of worms, especially the tape worm. The taste is bitter and unpleasant. The active principle is *kosin*, which is sometimes given by itself.

Brayman, Mason, American soldier and lawyer: b. Buffalo, N. Y., 1813; d. 1895. He learned the printer's trade in early life, but took up the study of law and was admitted to the bar in 1836. Removing to Illinois he was employed by that State to settle the difficulties with the Mormons of Nauvoo, and secured their removal in 1844. He served in the Federal army during the Civil War, and at its close was brevetted major-general. He was territorial governor of Idaho 1876-81, and after the last named date practised his profession at Ripon, Wis., until his death.

Brazen Sea, the copper basin or vase which King Solomon placed in the priest's court for the uses of the servitors. It was 5 cubits high and 30 in circumference, and was supported on 12 oxen facing outward. It seems probable that its original purpose was symbolical rather than practical. King Ahaz removed it to a stone pedestal and it was finally destroyed by the Chaldeans, who carried off the copper to Babylon.

Brazen Serpent, a bronze or copper figure which Moses is said to have made and set up before the Israelites for the healing of all who had been bitten by venomous serpents. As this was subsequently superstitiously adored by the Israelites it was destroyed by King Hezekiah. Among the Phœnicians the serpent was regarded as the symbol of the god of healing.

Brazil (The United States of Brazil), a republic bordering upon all of the South American countries except Chile, shares to a greater or less extent the natural resources and physical characteristics of each. But even more than its neighbors it requires, for the development of these resources on an adequate scale throughout its length (2,500 miles), and breadth (4,000 miles), both immigration and new industrial enterprises. The central fact concerning the vast Amazon region, stretching across the continent from a few degrees north to about 16° south of the equator, is that its rank vegetation defies the efforts of casual settlers, and nothing less than a teeming population could properly subdue it to human uses. The total area of Brazil, according to the most recent computation, is 3,218,130 square miles; and this includes the largest compact body of fertile and habitable territory that yet remains unimproved, and even, in part, unexplored. Nearly the entire population of the republic is still found on a com-

paratively narrow strip of land extending southward along the Atlantic coast from Para, below the mouth of the Amazon, to the line of Uruguay. In other words, the white people have clung to the fringe of the continent which their ancestors took possession of in the 16th century in the fashion we shall presently describe; and no civilizing conquest and occupation of the interior, such as occurred in North America, have been effectively undertaken. Except along or comparatively near the coast, the Brazilian states have less than one inhabitant per square mile. The number of inhabitants in the entire country was estimated at 20,515,000 in 1910, distributed as follows among the 20 states of the republic, and including 750,000 for the federal district:

State	Population	State	Population
Minas Geraes.....	4,277,000	Para.....	652,000
Bahia.....	3,335,000	Parabyba.....	596,000
San Paulo.....	2,820,000	Sergipe.....	450,000
Pernambuco.....	2,089,000	Piauhy.....	425,000
Rio Grande do Sul.....	1,350,000	Rio Grande Norte.....	407,000
Rio de Janeiro.....	1,300,000	Santa Catharina.....	405,000
Ceara.....	1,000,000	Parana.....	380,000
Alagoas.....	781,000	Goyaz.....	340,000
Maranhao.....	666,000	Amazonas.....	240,000
		Espirito Santo.....	201,000
		Mato Grosso.....	157,000

There were 2,705,000 foreigners in Brazil, namely, Italians, 1,300,000; Portuguese, 800,000; Germans, 300,000; Spanish, 100,000; Poles, 80,000; French, 10,000; English, 5,000; North Americans, 500; other nationalities, 110,000.

The above figures are estimates, but are approximately correct for 1910 at the time of the census. The total population in 1890, including 600,000 uncivilized Indians, was stated to be only 14,333,915.

History.—Brazil was discovered in 1500 by a companion of Columbus, Vicente Pinzon, who made no settlement, and, indeed, would not have been justified in doing so. The bull of Pope Alexander VI. (4 May 1493) had bestowed upon Portugal the lands which should be found east of the line of demarcation, and commissioners of Spain and Portugal had agreed, on 7 June 1494, that the position of the line of demarcation should be changed so that it should pass, north and south, 370 leagues west of the Cape Verde Islands, instead of at a distance of only 100 leagues west of those islands, where the Pope had established it. Accordingly Spain was precluded by her own act from claiming the eastern portion of the continent of South America. A Portuguese commander, Pedro Alvarez Cabral, when on his way around the Cape of Good Hope to the Far East, in 1500, encountered severe storms which drove his vessels from their course; and through this mischance he reached the Brazilian coast in April. Mass was celebrated there on Easter Day; the country was declared a dependency of Portugal, and a stone cross was erected. There Cabral himself embarked for India, but first sent a vessel to Lisbon with a report of this important discovery. As soon as practicable after receiving the account of his new possession, Dom Manuel placed three vessels under the command of Amerigo Vespucci, instructing this Florentine to make good Portugal's claim to the land which a Spaniard had discovered. Thus, from the beginning, Brazil was marked out as a field for international competition. Vespucci's first voyage being unsuccessful, a second was undertaken



THE HARBOR OF RIO.



MAY AVENUE, BUENOS AYRES.

The Government House is in the distance. The street's pavement is of Trinidad asphalt laid by an American Company

BRAZIL

with better results. He remained for five months at a point he named "All Saints," and when it became necessary to return left 12 men as a garrison in a small fort. The impression created by the experiences of the early adventurers was not highly favorable. Poor and unattractive, indeed, did this land seem in comparison with India and Africa. During the years that followed Portuguese merchants dispatched vessels to trade for Brazil-wood, and the Portuguese government jealously resisted French and Spanish attempts to gain a foothold or carry on commerce eastward of the line of demarcation; but the court at Lisbon continued to prefer the profits to be won along the course that Vasco da Gama had opened up. The first settlements, therefore, were not made by the government, but by grantees whom the government induced to colonize by assigning to each leader a splendid possession, or "captaincy"—no less than 50 leagues of coast, with feudal powers and the privilege of extending his domain as far inland as he desired. Thus the province of San Paulo was settled by an expedition under Piratininga; next Affonso de Sousa explored the coast from Rio de Janeiro (so called because it was discovered 1 Jan. 1531) to the Rio de la Plata. Lopes de Sousa received two allotments of 25 leagues each, one being near Pernambuco and Paraiba. Fernandez Coutinho and Pedro da Campo Tourinho established themselves near the spot where Cabral landed. Francisco Pereiro Coutinho received a grant of a captaincy, extending from Rio San Francisco to Bahia. The captaincy of Pernambuco was given to Duarte Coelho Pereira; and so the most attractive portions of the coast were distributed. Cattle and sugar-cane being introduced from Madeira, the systematic cultivation of the latter began; though some authorities maintain that both sugar-cane and coffee are indigenous to Brazilian soil. Enormous difficulties were encountered from the first by proprietors and planters. Only men of large means (including some of those adventurers who had amassed fortunes in India), were able to equip and maintain such a considerable force as was necessary if these undertakings were to be successful. The natives were, as a rule, extremely mistrustful, besides being the most savage of their kind, as Southey has shown in his elaborate description of them. ('History of Brazil,' by Robert Southey, 1810). Cannibalism was universally practised. In general, the nature of these Indians appears to have been far more debased, and their practices more revolting than the nature and customs of the Red Men of North America; the task of civilizing them seemed more utterly hopeless. Yet one striking exception to the general experience may be noted. The first settler in Bahia was Diogo Alvarez, a young man of noble family, who was wrecked on the shoals near that port. "Part of the crew," says Southey, "were lost, others were eaten by the natives." Diogo secured the favor of the Indians by recovering things from the wreck. Afterward he led them in battle, using his musket to such good effect that he became their sovereign, and took daughters of the chiefs of the savages to be his wives. "The best families in Bahia," we are told, "trace their origin to him."

By the middle of the 16th century the captaincies of those men whose names have been mentioned, and still other adventurers, were

scattered along the coast from the mouth of the Amazon to the mouth of the Rio de la Plata. The great mineral wealth of the country had not been discovered at that time, and the settlements were chiefly devoted to the cultivation of sugar. What with savages surrounding these widely separated posts; Spaniards threatening them from the rear (the Spanish troops then holding the regions afterward to be known as Paraguay and Argentina); and the French from time to time attempting to establish themselves on the coast; it was found necessary to provide for the common defense by concentrating the Portuguese power in the hands of a governor-general. The feudatories had to submit to the revocation of some of their privileges, though they remained on the soil which they owned.

The first governor-general was Trome da Sousa, and his capital was Bahia. In 1549 he was reinforced by a fleet of six vessels with 320 soldiers and officials, 400 convicts, 300 free colonists, and 6 Jesuits. At different times wards of the Crown, female orphans of good family, were sent out, provided with portions from the royal estates, and given to the provincial officers in marriage. The establishment of the College of San Paulo in Piratininga followed hard upon the arrival of the first bishop of Brazil in 1552, and of a number of Jesuits in 1553. Avowed friends and protectors of the natives, these members of the Society of Jesus took upon themselves the pioneers' task, and their college became a centre of influence. Intrusive French settlers at Rio de Janeiro were driven out by the governor, and a Portuguese colony was founded there in 1567. But the progress of Brazil, in so far as it was dependent upon the aid of the mother country, was checked, if not entirely arrested, during a period of 60 years. Philip II. of Spain acquired the crown of Portugal in 1578-80, and the union of the two countries—or rather, the subordination of the weaker nation—continued until 1640. Brazil received little attention during all these years, in part because she was identified with Portugal, but still more for the reason that her inferiority to the Spanish possessions in mineral wealth was taken for granted. The transfer of allegiance invited attack by English fleets. In 1586 Witherington sacked Bahia; Cavendish, in 1591, burned San Vicente; Lancaster, in 1595, captured Olinda. A futile attempt to found a permanent colony was made by the French (1612-18), and the Dutch dispatched a fleet against Bahia in 1624.

The Dutch in Brazil.—Most important were the efforts made at this time by an association of Dutch merchants, the famous Dutch West India Co., which commissioned Count Maurice of Nassau to promote the interests of his countrymen in South America. The enormous power of this corporate company, which, as Bancroft says, was "given leave to appropriate continents," and, when "invested with a boundless liberty of choice, culled the rich territories of Guiana, Brazil, and New Netherland," was exerted in a large part of the region lying between Maranhão and Bahia. After the revolution of 1640, Brazil was, indeed, no longer Spanish, but the new Portuguese executive of the house of Bragança was too poor and weak to adopt such vigorous measures as were required. Accordingly a suggestion offered by a native of Madeira named Vieyra was welcomed, inasmuch as this plan re-

BRAZIL

lieved the government of the obligation to fight the Dutch West India Co. Vieyra proposed the establishment of a commercial company at Liebon similar to that which had its headquarters at Amsterdam. The Brazil Co. of Portugal was organized, and in 1649 sent out its first fleet. After five years of severe fighting, the Portuguese merchants overcame the Dutch merchants.

For half a century Brazil was permitted to remain at peace. In 1710, however, a French squadron under Duclerc attacked Rio de Janeiro and suffered defeat. On 12 September of the following year Admiral Duguay Trouin arrived off Rio with a new fleet and 6,000 men. The governor was compelled to capitulate and to pay a large sum of money. A great change in the industrial conditions of the southern districts was produced by the discovery of diamonds at this time (1710-30), and by the rush to the gold regions opened up by the enterprise of the colonists of San Paulo—a hardy race, doubtless with a large admixture of Indian blood, much addicted to adventurous raids into the interior. Their explorations extended westward into Paraguay and northward into Minas, Goyaz, and Cuyabá in the state of Matto Grosso. Gold was discovered in the regions last mentioned; by the beginning of the 18th century there were five towns of considerable importance in Minas Geraes; and that state is now, as we have seen, the most populous of the republic. Laborers were withdrawn from the sugar industry by the superior attractions of mining, and Brazil lost her leading position as a sugar-producing country. The conspiracy of Minas in 1789 was the first sympathetic movement in Brazil occasioned by the Revolutionary War in North America. Inspired by the success of the English colonies in achieving independence, the inhabitants of Minas formed a project to throw off the Portuguese yoke, but the plot failed, the leader was hanged, and the conspirators were banished to Africa, from which continent slaves were being imported in large numbers. It was an unprofitable exchange for America. The French Revolution, among its extraordinary consequences, promoted Brazil from the humble position of a colony to be the seat of government of the Portuguese power, and the only American monarchy. In 1807 the threat of the invasion of Portugal by Napoleon sent the prince regent, afterward King John or Dom João VI., across the ocean (29 November). With him went the queen, the royal family, the great officers of state, and members of the nobility. He created many new offices, and otherwise made the machinery of government in Brazil much more elaborate than it had ever been; and, to meet the increased expenses that these changes involved, at first imposed new taxes, and afterward, by debasing the money standard, inaugurated the long period of financial error that has impeded the advancement of the country. On the other hand, Brazilian ports were declared open to the commerce of all nations at peace with Portugal. Thus John favored industrial development and injured it at the same time. Numbers of artisans and manufacturers from England, Germany, France, and Sweden came to take advantage of the new opportunity. In 1816 the School of Fine Arts was founded by French painters and sculptors. The occupation of Portugal by French troops was offset in

the new world by the incorporation of French Guiana with Brazil (1809); but the treaty of Vienna in 1815 restored Guiana to France. On 16 Jan 1815, the title of kingdom was conferred upon Brazil; and an important extension of the domain of this unique American monarchy was effected six years afterward, when Uruguay was united with it under the title of the Cisplatine State. But this union, like the occupation of French Guiana, was destined to be temporary, owing to the policy adopted by Argentina. See ARGENTINA.

Independence Proclaimed.—The general movement in favor of independence that transformed the Spanish colonies north, south, and west of Brazil into republics, produced conspiracies and plots in Bahia and Pernambuco. Troops were brought out from Portugal to restrain every violent manifestation of the republican spirit; meanwhile, however, in Portugal itself the revolution of 1820 had led to a modification of the old autocratic system, and the forces from that country, openly sympathizing with the aspirations of the Brazilian people, compelled King John to yield. The latter withdrew from America soon afterward (26 April 1821), leaving his son, Dom Pedro, to work out the problem in Brazil as best he might. The attitude of the Cortes of Portugal in this crisis was exceedingly unwise: instead of offering concessions, it directed the dissolution of the central government, and ordered Dom Pedro to return to Portugal. Assured of the support of the people of Rio de Janeiro and San Paulo, who requested him to disobey this command, Dom Pedro proclaimed the independence of Brazil, 7 Sept. 1822. He became constitutional emperor the following month. In the hostilities which ensued the Brazilians were so successful that independence was assured before the end of 1823. The constitution of the empire was adopted on 25 March 1824. But a peculiar situation in the ruling family remained to be disposed of. Since October 1822, Dom Pedro had been emperor of Brazil, while his father was king of Portugal. The dramatic climax occurred 25 Aug. 1825, when a treaty was signed in London by virtue of which King John first assumed the title of emperor of Brazil and then immediately abdicated in favor of his son. As the popularity of Dom Pedro I. was due to the disposition he showed at first to accede to the wishes of the liberals, so it is necessary to ascribe his loss of popularity in the years 1826-31 to his unwillingness to trust the people more and more, as their demand for participation in the government steadily increased. The statement found in some recent histories, to the effect that Pedro I. was a brutal tyrant, whose reign ended in public disgrace, is positively incorrect, and inculcates false views of this entire period. It was his tact that saved the monarchy in 1821; but the growth of republicanism in the next decade was much more rapid among the people than at his court, and finally the breach became so wide that no course was left to him but to surrender his crown before the succession of his son, the second Pedro, should be disputed, and to take ship for Lisbon, where it had become a duty to defend the claim of his daughter, Maria II., to the throne of Portugal. At any time after 1810 outrageous tyranny on the part of Portuguese rulers would have thrown Brazil into the advancing column of revolutionary states. The

BRAZIL

significant facts are, that Pedro I. was able to postpone the inevitable change for 10 years, and that Pedro II. (whose majority was proclaimed 23 July 1840) succeeded in maintaining the monarchical form in America until 15 Nov. 1889. The regency by which the affairs of Brazil were administered (1831-40) was much like a republican government, especially after 1834. Probably it would have been impossible to revert to a monarchy if the weakness and misconduct of the regents had not brought discredit upon everything savoring of democracy; certainly the rôle of emperor in the largest American country could not have been sustained so long except by a sincere advocate of progress, and an enlightened patron of every humanitarian and scientific enterprise. Such was Pedro II. The suppression of the revolution of 1848; the discontinuance of the importation of slaves, in 1853; and the creditable part taken by Brazil in thwarting the ambitious designs of the Argentine dictator, Rosas (See ARGENTINA)—these are the chief events before 1855. In that year a Brazilian squadron was sent to settle a dispute with Paraguay as to the right of way for Brazilian vessels on the Paraná River, which, rising in Brazil, flowing through Paraguay, and finally through the territory of Argentina, should be open to the commerce of all three nations equally. The warships failed to accomplish the desired result, and for a decade vexatious restrictions were placed upon the vessels of Brazil, Argentina, and the United States. In 1864 an outrage by Señor Lopez, the dictator of Paraguay, brought on a war in which Brazil, Argentina, and Uruguay were allied against the offending country. (See PARAGUAY). This bitter struggle, protracted until 1870, cost Brazil the lives of many thousands of her citizens, and in money about \$300,000,000. In the year following the restoration of peace a law was enacted for the abolition of the institution of slavery, the growth of which had been checked, as we have seen, in 1853. It was provided that thenceforth every child born of slave parents should be free.

Brazil a Republic.—A bloodless revolution terminated the reign of Dom Pedro II., and the Federal republic was proclaimed, 15 Nov. 1889. A provisional government, instituted for this purpose, published (24 Feb. 1891) the constitution of "The United States of Brazil," resembling that of the United States of America in nearly every respect, though Brazilian senators serve for nine years, like those of Argentina, while the president's term of office is but four years. Marshal Deodoro da Fonseca, head of the provisional government, was confirmed in the presidency by the constitutional congress, and Gen. Floriano Peixotto was elected vice-president. The next president (15 Nov. 1894) was Prudente de Moraes Barros. The third president, Dr. Manoel Ferraz de Campos Salles, was elected for the term beginning 15 Nov. 1898. His successor, Señor Francisco de Paula Rodrigues Alves, inaugurated 15 Nov. 1902, made a statement of the national policy in his inaugural address which should receive general attention. It may be summarized as follows: A good financial condition in the republic is of prime importance; but scarcely less essential are reforms in the laws applicable to civil suits and elections. Agricultural and commercial conditions must be improved, and endeavors made to

attract immigration and capital. Modern systems of sanitation must be installed at the ports, including Rio de Janeiro. The augmentation of the army and navy may be undertaken when the condition of the treasury warrants such expenditures.

It will be readily understood that the circumstances to which reference has been made in this sketch—such as the issuance of large amounts of paper currency, which it was formerly the fashion to call irredeemable; the change from the basis of slave to free labor; the overthrow of the monarchy; foreign wars, and rebellions in one state after another—have combined to depress Brazilian credit and retard industrial development. To these unfavorable influences must be added the decline in the prices of coffee, Brazil's staple product, and of sugar, her chief reliance in times past. On the other hand there is observable a tendency toward greater stability in the national policy; a large amount of paper money has been called in and destroyed; and at least a moderate interest has been shown recently in efforts to develop the enormous natural resources of the country.

Commerce.—The following statistics are taken from the very complete report of American Vice-Consul-General Joseph J. Slechta at Rio de Janeiro. They supply the main details of commerce for the year 1909. The total value of foreign trade for the year amounted to \$488,021,954 United States gold, as compared with \$388,286,447 in 1908 and \$459,316,820 in 1907. The losses suffered by Brazilian trade in 1908 were thus more than regained, thanks to the enormous increase in the country's exports, to which the general increase is mainly due. The value of imports was \$179,690,125 and of exports \$308,331,829. The figures for 1908 were: Imports \$173,017,849; exports \$215,226,136. The increase in imports for the year was \$6,672,276, about 4 per cent, and of exports \$93,105,693, about 44 per cent. The balance of trade in 1909, or the excess of exports over imports, amounted to \$129,641,704; in 1908 it was \$42,019,769, and in 1907, \$66,199,080. The principal imports for 1909, particularized by articles, were as follows:

Imports	1909
Live animal products.....	\$1,393,077
Cotton, yarn, thread.....	2,553,458
Iron and steel.....	1,603,590
Jute and hemp.....	2,258,228
Lumber.....	1,991,684
Materials for perfumes and paints.....	2,067,787
Plants and seeds.....	1,191,908
Stone, earth and minerals.....	13,219,408
Hides and skins.....	2,565,586
Vegetable gums, etc.....	1,348,402
Under lumber were imported, pine.....	1,568,017
Under stone, earth, etc., were imported, coal..	8,689,482
Cotton manufactures.....	12,479,495
Arms and munitions.....	5,764,458
Carriages and vehicles.....	2,767,500
Copper and manufactures.....	1,778,293
Iron and steel manufactures.....	19,387,837
Manufactures of wool.....	2,472,670
Manufactures of flax.....	1,266,064
Manufactures of porcelain.....	2,532,266
Machinery, etc.....	17,132,316
Manufactures of paper.....	3,953,983
Manufactures of stone, earth, etc.....	1,073,360
Perfumes, inks, paints, etc.....	1,643,388
Chemical products and pharmaceutical supplies	4,256,058
Miscellaneous manufactures.....	13,725,622
Under cotton manufactures were imported:	
White cloth.....	1,243,605
Prints.....	1,372,529
Dyed goods.....	2,426,802
Not specified.....	3,583,419
Manufactures not specified.....	1,820,925

BRAZIL

Imports	1909
Under carriages and vehicles were imported:	
Railroad and street cars	1,974,306
Under iron and steel manufactures were imported:	
Wire	1,774,776
Axles	2,527,855
Building hardware	7,677,896
Under machinery were imported:	
Electrical	2,356,846
Miscellaneous hardware	1,692,604
Locomotives	2,016,490
Industrial machinery	3,117,823
Under miscellaneous manufactures were imported, kerosene	3,681,209
Codfish	4,079,400
Flour	9,269,847
Money and specie (not included in above)	42,706,221

Army and Navy.—The Brazilian navy in 1901 comprised: 2 battleships of the old style; 2 coast-defense vessels, comparatively modern; 2 old monitors; 7 small cruisers, of which number 3 were unarmored; 6 gunboats, armored, and 18 unarmored; 24 torpedo-boats of all classes; 4 torpedo-cruisers; 2 submarine boats. To man these vessels there were 4,000 seamen, 1,000 stokers, and 450 marine infantry. The army included 484 staff officers; 1,573 officers and 9,035 men in the infantry, and, in the cavalry and engineers, 606 officers and 3,179 men, and 1,400 cadets. The only serious war-cloud at the beginning of 1903 arose out of a dispute with Bolivia over Acre. See ACRE RIVER.

Climate.—The rainy season begins for the hot lowlands of the north in December or January and continues until May or June, the remaining half of the year being dry. In the highlands of the southern and central regions the four seasons of the year are well defined. Throughout the Amazon basin the seasonal variation of temperature is small—from 75° to 90°; and the prevailing winds, the "trades" from the east, mitigate the equatorial conditions. In the high plains of the states of Rio Grande do Sul and San Paulo the mercury sometimes falls to the freezing point. Except in the neighborhood of swamps, marshy or undrained districts, etc., climate is moderately healthful, and the mortality in the best of the towns does not compare unfavorably with that of cities in the United States.

Resources.—In 1909 the exports of coffee to the United States amounted to 16,880,696 bags, valued at \$161,922,682. The total exports of rubber from the Amazon valley (lower, upper, and Iquitos districts) in 1909 were 39,027 metric tons. Tobacco, cotton, cacao, Brazil nuts, rice, sugar—these are some of the vegetable products. There is practically no limit to the number of agricultural enterprises that can be successfully carried on in the table-lands, the broad, open valleys, and the lowlands forming the basin of the Amazon. In the higher regions and mountains the mineral wealth of the republic is being developed. In less than a year 2,435,866 grams of gold, 37,915 tons of manganese, and precious stones to the value of 464 centos have been exported from the state of Minas Geraes. The iron-ore regions are situated within a zone of about 3,200 square miles, from 3,000 to 5,000 feet above the level of the sea, and about 310 miles from Rio de Janeiro, which is the nearest port. The output of diamonds and carbons in the state of Bahia is of special interest. Prior to the discovery of the South African mines this was the greatest diamond-producing centre, and the Paran-

guacu district is the only place in the world where carbons are found of marketable size. An excellent statement is made by Señor Fontoura Xavier, consul-general of Brazil in New York, who enumerates the gems found in Goyaz, Matto Grosso, Paraná, Rio Grande do Sul, and San Paulo, as well as in the states mentioned above. Black diamonds, emeralds, sapphires, rubies, beryls, amethysts, garnets, opals, chalcedonies, sapphirines, agates, and cornelians are found, some of them in great abundance. "One of the carboniferous basins of Brazil is in the state of Santa Catharina. In the state of Rio Grande do Sul there have been discovered four large outcrops of coal. Bitumen exists in nearly all of the states." Native sulphur, nitrate, salt, sulphate of magnesia are also mentioned. The average annual value of the gold and diamonds exported is said to be about \$7,400,000. In Rio Grande do Sul are copper mines, in Paraná quicksilver mines; galena and lead mines in widely separated regions.

Finances.—The gross receipts of the government from all sources for the fiscal year 1909 were \$165,508,766, and the expenditures were \$177,812,425.

The budget for 1910, as published, estimates ordinary receipts at \$46,700,790 gold, and \$14,977,920 paper. Extraordinary receipts to be applied to special funds are estimated at \$10,704,853 gold and \$7,458,000 paper. The foreign debt amounts to \$391,600,390. On 3 Jan. 1910, a decree was issued by the President authorizing the Minister of Finance to resume during the present year payments on account of the foreign debt. This anticipates by eighteen months the time specified in the funding loan agreement entered into with the foreign bondholders in June 1898, the amortization of the foreign debt was suspended for a period of thirteen years, or until June 1911. The total internal debt registered is \$300,562,130 (paper), to which should be added \$9,945,650 on account of the decree of 7 Feb. 1909, representing railway construction of the Madeira-Mamore Railway, making a total of \$310,507,780. From this should be deducted \$14,601,400 which represents the redemption of certificates on account of the loan of 1897. Making this deduction, the internal debt stands at \$295,906,380. On 31 Dec. 1908, there was in circulation paper money to the amount of \$349,075,569. On the same date in 1909 the amount was \$345,649,003. This circulation has been further reduced in the year 1910, so that at the end of March it stood at \$344,891,394. A decree issued on 16 Dec. 1909, authorizes the issue of internal bonds bearing 3 per cent interest, payable semi-annually, to the amount of \$992,954 in payment of claims awarded to Bolivia by the Claims Commission created under the terms of the treaty of 17 Nov. 1903.

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BRAZIL — BRAZING

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MARION WILCOX,

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Brazil', Ind., a city and county capital of Clay County, 16 miles northeast of Terre Haute. It is an important railroad centre and in its vicinity are rich mines of block coal. Inexhaustible deposits of clay and shales are also found here and the city contains manufactures of pumps, tiles, machinery, etc. Brazil was incorporated in 1873, is governed by a mayor, elected quadrennially, and a city council; has a public library and controls its own waterworks. Pop. (1910) 9,340.

Brazil-cabbage, or **Chow Caraibe** (*Caladium sagittifolium* or *Xanthosoma sagittifolium*), a West Indian plant of the natural order *Araceae*, widely cultivated in the tropics for its starchy edible tubers, which are used like potatoes, and its succulent leaves, which are cooked like spinach. The plant almost entirely lacks the acrid principle which characterizes other members of the order.

Brazil-nut, **Castanea**, **Cream Nut**, **Nigger-toe**, **Para Nut**, the seeds of two species of Brazilian trees, the only ones of their genus, of the natural order *Myrtaceae*. The better known species, *Bertholletia excelsa*, is a tree which often attains a height of 150 feet and a diameter of four feet. It has bright green, leathery leaves, two feet long and six inches wide, and cream-colored flowers followed by very hard-shelled

fruits about six inches in diameter, containing about 20, three-sided, wrinkled seeds which are largely exported from Para and from ports of French Guiana. They are used for dessert and confectionery and for the manufacture of an expressed oil used in oil painting, lubricating, and lighting. Though of stately dimensions, the tree is of little decorative use. It covers extensive tracts in northern Brazil, and is especially abundant along the Amazon and Orinoco rivers. The seeds of the monkey-pot tree, known as sapucaia nuts (q.v.), are considered superior to Brazil-nuts, but are not yet commercially important, owing to the distance they must be transported from the interior country.

Brazil Tea, a drink prepared from the leaves of *Ilex paraguensis*.

Brazil-wood. A dark-red or brown dye-wood exported from the West Indies, Brazil, and other South American countries. Various grades appear in the market under diverse names, such as Pernambuco wood (*Casalpinia echinata*), St. Martha wood, and All Saints' wood, which are most valued. Except in a few cases botanists have not definitely determined the species which furnish the different grades, but large quantities are derived from *C. brasiliensis*, a small tree, bipinnate leaves, and flowers in panicles. It is indigenous in rocky ground, especially in the West Indies. The valuable part is the heart-wood, of which there is but little when compared with the thick, valueless sap-wood. This useful part is at first light colored, but becomes dark when exposed to light, air, moisture, etc. Formerly it was largely used in dyeing, but coal-tar dyes and other manufactured dyes have generally supplanted it. It is still used in ink-making. The name is said to be derived from *Braxilis*, not *Brazil*, since sappan wood, which is believed to be identical, was used prior to the discovery of America.

Brazilian Grass, an incorrect name popularly applied to a substance used in the manufacture of a very cheap kind of hats, known as Brazilian grass hats, and also as chip hats. It consists of strips of the leaves of a palm, *Chamærops argentea*, which are imported for this manufacture, and chiefly from Cuba.

Brazilian Pebble, a colorless and transparent variety of quartz, used for high-grade lenses.

Braz'ing, or **Brass-soldering**, the process of uniting two pieces of brass, two pieces of copper, or one of each by means of a hard solder, that is, a solder which fuses at a comparatively high temperature. The solder is applied in the form of a coarse powder, and is always mixed with borax, to prevent the oxidation of the metals soldered together. It is usual to moisten this mixture with water before spreading it over the surfaces to be joined. When the solder has been applied in this state, the pieces of metal are slowly heated, by which the water is made to evaporate, leaving a crust of the solder on the parts where it is required. The pieces are then exposed to a stronger heat, until the borax melts and fluxes the solder, which suddenly flushes the joints of the pieces of metal, and thus unites the two surfaces, making them into one piece. The whole is now allowed to cool, and is afterward dressed with a file. Pieces of metal united in this way are held together as firmly as if they were only one piece.

BRAZOS—BREACH

Brazos, brā'zōs, formerly called **Brasos-de-Dios**, a large river in Texas, rising in the elevated region of northwestern Texas, once known as the Staked Plain, between the parallels of 33° and 34°. It flows southeastward between the Colorado and Trinity, and after a course of about 900 miles falls into the Gulf of Mexico, between Quintana and Velasco, 40 miles west-southwest of Galveston. It is navigable by steamers during the wet season for about 300 miles. Among the towns on its banks the chief is Waco, about halfway from its mouth, now an important railway centre. The cotton plantations on the Brazos are highly productive.

Brazos de Santiago, da sân-tē-ā'gō, Texas, a village 30 miles east of Brownsville, on the northern bank of the Rio Grande, in Cameron County. The battles of Palo Alto and Resaca de la Palma, in 1846, were fought about half way between Brazos and Matamoras. It carries on much coasting and foreign trade, although a shifting sand bar is a serious obstacle to its commerce.

Brazza, brāt'sa (ancient BRACHIA), an island of Austria, in the Adriatic Sea, belonging to Dalmatia, of which it constitutes a separate administrative district; lat. 43° 16' N.; lon. 16° 37' E. It is 24 miles long, and from five to seven broad; contains 20 villages, and is separated from the mainland by a channel 12 miles broad, which affords excellent anchorage for shipping. The island is mountainous and well wooded; and in the valleys vines are grown, from which are made the best wines in Dalmatia. It produces also good oil, almonds, and saffron, and grain in small quantity. Much attention is paid to the cultivation of bees and silk-worms. The chief town, St. Pietro di Brazza, has a small port, defended by a mole. Pop. about 25,000.

Brazza-Savorgnan, Pierre Paul François Camille, pē-ār pōl frañ-swā kā-mēl brāt-sa-sā-vōr-nyāñ, French explorer: b. on board ship, off Rio de Janeiro, Brazil, 26 Jan. 1852; d. Dakar, French West Africa, 15 Sept. 1905. He entered the French navy in 1875, after becoming a naturalized French citizen, and during 1876-8 explored the Ogowe and Congo regions of Africa, and made treaties between France and the natives, founding Franceville and several other villages. In 1886 he was made governor of the French Congo and Gaboon colonies, which he had thus secured. Brazzaville on the Congo River is named after him. After a sojourn in France, he returned to Africa in 1890 as commissioner-general of the whole of French Congo. The next six years were spent in explorations and securing of French authority in central Africa, after which, in 1897, he returned to France.

Brazzaville, brāt'sa-vēl, a town on the French side of the Congo at the lower end of Stanley Pool. It stands nearly opposite Leopoldville, in the Congo Free State. See BRAZZA-SAVORGNAN.

Breach, the aperture or passage made in the wall of any fortified place, by the ordnance of the besiegers, for the purpose of entering the fortress. They should be made where there is the least defense, that is, in the front or face of the bastions. In order to divide the resistance of the besieged, breaches are commonly

made at once in the faces of the attacked bastions and in the ravelin. This is effected by battering, and at such places as the cannon do not reach, by the aid of mines. The breach is called practicable if it is large enough to afford some hope of success in case of an assault. This is generally considered to be the case if it allows a passage to 14 men abreast. Frequently, however, a breach of much less extent, even of half that width, may be entered.

Breach, any violation of law or obligation. A continuing breach is one where the condition of things constituting a breach continues during a period of time, or where the acts constituting a breach are repeated at brief intervals. In pleading, a breach is that part of the complaint in which the violation of the defendant's contract is stated. It is usual in assumpsit, where the common-law rules of pleading are still in force, to introduce the statement of the particular breach, with the allegation that the defendant, contriving and fraudulently intending craftily and subtly to deceive and defraud the plaintiff, neglected and refused to perform, or performed the particular act, contrary to the previous stipulation. In debt, the breach or cause of action complained of must proceed only for the non-payment of money previously alleged to be payable; and such breach is very similar whether the action be in debt on simple contract, specialty, record, or statute.

Breach of Promise of Marriage.—An action, lies for this on the part of either man or woman, though, as a rule, only the latter is believed to be substantially injured or deserve damages. There must be a legal and valid consideration, but as there are always mutual promises they are a sufficient consideration for each other. The minds of the parties must meet; that is, there must be a request or proposition on the one side and an assent on the other. If the communications between the parties are verbal, the only questions which usually arise relate to evidence and proof. The exact words or time or manner of the promise need not be proved, but it may be inferred from the conduct of the parties and from the circumstances which usually attend a promise to marry. (15 Mass. 1; 2 Penn. St. 80.) When the parties are at a distance from each other, and the offer is made by letter, it will be presumed to continue for a reasonable time for the consideration of the party addressed, and if accepted within a reasonable time, and before it is expressly revoked, the contract is then complete.

A promise of marriage is not within the third clause of the fourth section of the statute of frauds, relating to agreements made upon consideration of marriage; but if not to be performed within one year it is within the fifth clause, and must therefore be in writing in order to be binding. If no time be fixed and agreed upon for the performance of the contract, it is in contemplation of law a contract to marry within a reasonable period after request, and either party may call upon the other to fulfill the engagement, and in case of default may bring an action for damages. If both parties lie by for an unreasonable period, and do not treat the contract as continuing, it will be deemed to be abandoned by mutual consent. The defenses which may be made to an action for breach of promise of marriage are, of course, various; but

it is only necessary to notice in this place such as are in some degree peculiar. Thus, if either party has been convicted of an infamous crime, or has sustained a bad character generally, and the other was ignorant of it at the time of the engagement; or if the woman has committed fornication, and this was unknown at the time to the man who promised to marry her; or if the woman is deeply involved in debt at the time of the engagement, and the fact is kept secret from her intended husband; or if false representations are made by the woman, or by her friends in collusion with her, as to her circumstances and situation in life and the amount of her fortune and marriage portion,—any of these facts, if properly pleaded, will constitute a good defense. If after the engagement either party is guilty of gross misconduct, inconsistent with the character which he or she was fairly presumed to possess, the other party will be released. If the woman insists upon having her property settled to her own personal use, it is said that this will justify the man in breaking off the engagement. So, if the situation and position of either of the parties as regards his or her fitness for the marriage relation is materially and permanently altered for the worse (whether with or without the fault of such party) after the engagement, this will release the other party.

Breach of Warranty.—In sales of personal property an express warranty is one by which the warrantor covenants or undertakes to insure that the thing which is the subject of the contract is, or is not, as there mentioned; as that a horse is sound, that he is not five years old, etc.

An implied warranty is one which, not being expressly made, the law implies by the fact of the sale. For example, the seller is understood to warrant the title of goods he sells, when they are in his possession at the time of the sale. (1 *Ld. Raym.* 593.) In general there is no implied warranty of the quality of the goods sold. The rule of the civil law was that a fair price implied a warranty of quality. This rule has been adopted in Louisiana and South Carolina. There may be an implied warranty as to character, and even as to quality, from statements of the seller, or a purchase for a specified purpose. Any substantial failure, in the article supplied to the buyer in pursuance of the contract of sale, to come up to the quality warranted, amounts to a breach of the warranty, and proof of it establishes the buyer's right to an action therefor. This rule applies to all cases where the remedy sought is by an action on the warranty for damages, or by way of set-off in a suit for the purchase-money; in such cases the buyer is bound to prove the breach and the damages suffered by him in consequence of it, and can recover only to the extent of the damage so proved. A warranty of soundness does not extend to a visible defect. A vendor of personal property is not liable for latent defects, known to him, but unknown to the purchaser, unless he has used some artifice to deceive the purchaser in regard to such defects or has warranted the article. Where an article is warranted as fit for a certain purpose, the seller is liable for an injury sustained by the vendee in consequence of its unsuitness. Under an executory contract to sell goods *in transitu*, the vendor is obliged to tender a merchantable article. On a sale of an article known to be intended for food there is an implied warranty that it is sound, wholesome,

and fit to be used as an article of food. (15 *Hon.* 504.) The authority of an agent to warrant goods sold will be implied where it is usual in the market to give a warranty on the sale of such goods; such authority, however, will be implied only as to goods sold at the time of the warranty, which will not extend to subsequent sales in the absence of express warranty.

Breach of Duty.—The non-performance of a duty, or the performance of it in such a manner that injury is done to one's employer, through want of integrity or due diligence and skill. It is assumed that there is an implied contract between an employer and the person that he employs, according to which the latter agrees to perform the duties entrusted to him in such a manner that the interests of his employer shall not suffer. In case of breach of duty, what is called an action of *assumpsit*—that is, an action for the recovery of damages for the non-performance of a promise, which, though not under seal, is yet founded on proper consideration—may be brought by the one who has sustained an injury, against the persons by whom the breach has been committed.

Breach of Peace.—The taking part in any riot, affray, or tumult, which is destructive to the public tranquillity, or the causing others to do anything to injure the public tranquillity. The former are actual, the latter constructive breaches. In both cases the breach of the peace may be either felonious or not felonious. The felonious breaches of the peace are three in number: (1) The riotous assembling of 12 or more persons, and not dispersing upon proclamation; (2) the riotous demolishing of churches, houses, buildings, or machinery; (3) maliciously sending, delivering, or uttering, or directly or indirectly causing to be received, knowing the contents thereof, any letter or writing threatening to kill or murder any person. The remaining offenses are not felonious, and include: (1) affrays; (2) riots, routs, and unlawful assemblies, which must have at least three persons to constitute them; (3) tumultuously petitioning; (4) forcible entry or detainer, which is committed by violently taking or keeping possession of lands or tenements with menaces, force, and arms, and without the authority of the law; (5) riding, or going armed, with dangerous or unusual weapons, terrifying the good people of the land; (6) spreading false news; (7) false and pretended prophecies, with intent to disturb the peace. Finally, there are two constructive breaches of the peace, namely, challenging another to fight, or bearing such a challenge, and the making public by either printing, writing, signs, or pictures, malicious defamations of any person, especially a magistrate, in order to provoke him to wrath or expose him to public hatred, contempt, and ridicule.

Breach of Trust.—A violation of duty by a trustee, executor, or any other person in a fiduciary position. A trustee is not permitted to manage an estate entrusted to him, in such a manner as to derive any advantage to himself, and at the same time he is bound to manage it in such a manner that the person for whom he has it in trust shall reap from it the greatest possible advantage. Accordingly money held in trust by a trustee must be invested by him in government stock, or in certain other special securities, for the behoof of him for whom he has the money in trust; and if he has not done

BREAD AND BREAD MAKING

so he is, as a general rule, liable for interest on the trust funds. Formerly it was the duty of the trustee to invest money in government securities alone, but under certain acts (unless the trust deed expressly forbids) a number of other sound investments are allowed. A trustee who has grossly mismanaged his trust may have to repay money lost, with interest, and sometimes compound interest. (See TRUSTEE.) The court of chancery has adopted two rules to guide the decisions with respect to the liability consequent upon a breach of trust. The purport of the first is, that with a view not to strike terror into persons acting for the benefit of others, the court will deal leniently with trustees who have endeavored fairly to discharge their duty, and in case of any misapplication of the trust money the court will not hold the trustees liable on slight grounds. The second rule is, that care must be had to guard against any abuse of their trust on the part of the trustees. A fraudulent misuse of trust funds is punishable as a misdemeanor with fine and imprisonment.

Bread and Bread Making. Bread is the product obtained by baking a mixture made of wheat flour or the meal from any cereal and water alone, milk, or milk and water, shortening and yeast, or baking powder. Unleavened bread is that made without yeast or other leavening agent. Ordinarily, the term bread is applied to the product made from wheat flour, but other cereals either alone or mixed with wheat are used for bread-making purposes, as rye, corn, and, to a limited extent, barley. Wheat and rye, however, are the only cereals which yield a gluten specially adapted to retaining gas and producing a light, porous dough and bread.

Bread making is an ancient art. In prehistoric times there is abundant evidence of the baking and use of cereals as food. The earliest historians speak of bread and bread making. Bread is frequently mentioned in the Bible, particularly unleavened bread, suggesting that leavened bread was known at that time. It was in Egypt that bread making first reached any degree of perfection. The art of bread making has kept pace with the advance of civilization; the more perfect the system of bread making, the higher the grade of civilization. From Egypt, bread making was introduced into Greece and from there into Italy, and later it followed with the advance of Roman civilization. Among the more civilized American Indian nations, particularly the Aztecs and cliff-dwellers, bread making reached a comparatively high grade.

Methods of bread making vary considerably among different nations, although the underlying principles with all are essentially the same. The main differences are in the way in which the yeast or ferment material is employed, and the method of manipulation. During recent years, study of the yeast plant has resulted in improved methods of bread making. The purity of the yeast and the quality of the flour are the two most essential features for the production of bread of good quality.

Yeast is a unicellular plant which readily reproduces itself by the process of "budding" when added to a batter containing small amounts of saccharine, mineral, and nitrogenous matter. Flour contains all of the food required for the propagation of the yeast plant, which secretes a number of chemical compounds called enzymes which are active agents in bring-

ing about the chemical changes that take place in bread making. Pasteur in his work on fermentation states: "In introducing a quantity of yeast into a saccharine wort, it must be borne in mind that we are sowing a multitude of minute living cells, representing so many centres of life, capable of vegetating with extraordinary rapidity in a medium adapted to their nutrition. This phenomenon can occur at any temperature between zero and 55° C. (131° F.), although a temperature between 15° C. and 30° C. (59° F. and 86° F.) is the most favorable to its occurrence." The individuality of the yeast plant, the nature and amount of its food supply and the conditions under which it develops determine the value of the yeast. When compelled to work in the presence of or to contend with other ferment bodies, the yeast is contaminated and is of lessened value for bread-making purposes. Yeast, like plants of higher orders, is often poorly nourished. Yeast used for brewing purposes is developed from healthy, vigorous, well-nourished yeast plants, and is called high yeast. See BREWING.

The different forms in which yeast is used, as dry cakes, sour dough, compressed soft cakes, brewers' yeast, etc., are simply different ways for preserving and introducing the yeast into the dough so as to leaven the entire mass. The different kinds of yeast vary with the individuality and character of the yeast plants.

Air takes an important part in bread making; its action upon yeast is briefly summarized by Pasteur as follows: "Fermentation by means of yeast appears, therefore, to be essentially connected with the property possessed by this minute cellular plant of performing its respiratory functions, somehow or other, with oxygen existing combined in sugar. Its fermentative power varies considerably between two limits, fixed by the greatest and least possible access to free oxygen which the plant has in the process of nutrition. If we supply it with a sufficient quantity of free oxygen for the necessities of life, nutrition, and respiratory combustions; in other words, if we cause it to live after the manner of a mold, properly so called, it ceases to be a ferment; that is, the ratio between the weight of the plant developed and that of the sugar decomposed, which forms its principal food, is similar in amount to that in the case of fungi. On the other hand, if we deprive the yeast of air entirely, or cause it to develop in a saccharine medium deprived of free oxygen, it will multiply just as if air were present, although with less activity, and under these circumstances its fermentative character will be most marked; under these circumstances, moreover, we shall find the greatest disproportion, all other conditions being the same, between the weight of yeast formed and the weight of sugar decomposed. Lastly, if free oxygen occur in varying quantities, the ferment power of the yeast may pass through all the degrees comprehended between the two extreme limits of which we have spoken."

According to Brown, "yeast cells can use oxygen in the manner of ordinary aerobic fungi, and probably require it for the full completion of their life-history; but the exhibition of their fermentative functions is independent of their environment with regard to free oxygen."

From the investigations of Pasteur, Brown, and others, it would appear that during knead-

BREAD AND BREAD MAKING

ing and aeration, the fermentation process is changed from anaerobic to aerobic form, which appears necessary in order that the full development and complete workings of the yeast cells can take place.

The principal chemical changes which take place in bread making are: (1) production of carbon dioxide and alcohol; (2) change of insoluble carbohydrates to soluble form; (3) production of lactic and other acids; (4) formation of volatile hydrocarbon derivatives; (5) change of solubility and molecular structure of the proteid compounds; (6) formation of amide and ammonium compounds from proteids; and (7) partial oxidation of the fat. The agents which bring about these chemical changes are ferments and heat. The yeast plant, as previously stated, secretes a number of enzymes or chemical products which are active agents in producing chemical changes. Diastase and invertase act upon the carbohydrates forming dextrose sugars which undergo alcoholic fermentation. This results in the production of about one per cent each of carbon dioxide and alcohol. During the process of baking, nearly all of the alcohol is expelled, as only traces of alcohol have been obtained in fresh bread. The joint action of the yeast and heat upon the starch granules results in changing about 6 per cent of the starch to soluble forms as dextrin and dextrose sugars. Some of the starch grains are ruptured, others are partially disintegrated by the ferment action, while many appear to be unaltered. These physical changes of the starch granules render bread more susceptible to the action of the digestive fluids.

Lactic, acetic, and occasionally butyric and other acids are formed during bread making, particularly if the alcoholic ferment becomes inactive and sour dough is formed. From 3 to 4 per cent of acid, calculated as lactic acid, is formed and unites with the gluten proteids during the baking process. The amount of volatile hydrocarbon derivatives formed during bread making is small, less than .10 of a per cent. These compounds give the characteristic aroma to freshly baked bread.

The wheat proteids undergo a number of chemical changes during bread making. (See WHEAT; WHEAT FLOUR.) While the proteids of wheat are mainly in the form of insoluble glutens, small amounts are present as albumin and globulin. Wheat gluten is composed of two substances: gliadin, a glue-like body, and glutenin, a gray powder to which the bands of gliadin adhere. Gliadin constitutes the binding material of the flour, and enables the dough to retain the carbon dioxide gas formed during fermentation and this leavens the bread. An excessive amount of gliadin produces a soft sticky dough, while an excess of glutenin reduces the power of expansion of the dough. In hard wheat flours, the gluten is composed of about 35 per cent glutenin and 65 per cent gliadin. The ratio of gliadin to glutenin determines very largely the quality of the bread. The removal of the gliadin proteid from flour results in a loss of bread-making properties, as the dough fails to expand. Any interference with the gliadin-glutenin ratio in flour affects its bread-making qualities.

Yeast is employed in bread making, not only to produce gas and expand the dough, but also

to produce other chemical changes as formation of acid bodies that combine with the proteids to form acid proteids which frequently favorably affect the gliadin-glutenin ratio. Because of the difference in the amounts of gliadin and glutenin in flours, the methods of bread making must be varied to meet the requirements of different kinds of flour.

In average bread making, from 1¼ to 2 per cent of dry matter is lost by fermentation and the formation of volatile products as carbon dioxide, alcohol, volatile hydrocarbons, and ammonium products. The losses fall alike upon both the carbohydrates and proteids. With prolonged fermentation, the losses of dry matter may amount to 5 per cent or more.

Bread varies in chemical composition according to the quality of the flour from which it is made. Some flours contain 12 per cent and more of proteids, while others contain 8 per cent and less, according to the composition of the wheat from which the flour has been milled. (See WHEAT.) Flours of high protein content contain proportionally less starch than low protein flours. The starch and protein content of flour and bread vary inversely.

COMPOSITION OF BREAD.

Bread made from white straight grade flour of:	Water Per cent	Protein Per cent	Starch and Carbohydrates Per cent	Ash Per cent	Fat Per cent
(1) High protein content	36.97	10.12	51.70	.45	.96
(2) Average protein content	32.90	9.57	55.44	.81	1.28
(3) Low protein content	32.10	7.21	59.29	.52	.88

When either whole or skim milk is used, the bread contains more protein. The use of milk in bread making is desirable because of its increasing the nutritive value of the bread product. The amount of fat in bread varies with the amount of lard, butter, or other form of shortening used in the making. Occasionally a large amount of lard is used to prevent the bread from drying out too rapidly.

The composition of bread is influenced also by the method of milling the wheat. The outer and aleurone layers of the wheat kernel contain more nitrogen, fat, and ash than the floury portion, hence their addition, as in graham and entire-wheat flours causes the bread to be richer in these compounds. When milled from the same lot of wheat, graham, entire-wheat, and white flours have the following composition:

	Protein Per cent	Fat Per cent	Carbohydrates Per cent	Ash Per cent
Straight (white flour) ..	11.99	1.61	75.36	.50
Entire-wheat flour	12.26	2.24	73.67	1.02
Graham flour	12.65	2.44	74.58	1.72

Digestion experiments have shown that the finer grades of white flour are more digestible than either graham or entire-wheat flour; the

BREAD AND BREAD MAKING

comparative digestibility of the three kinds of flour being as follows:

	Per Cent Digested		
	Protein	Carbo-hydrates	Calories
White bread.....	85.3	97.5	90.1
Entire-wheat bread...	80.4	94.1	85.5
Graham bread.....	77.6	88.4	80.7

The higher degree of digestibility of the white bread results in its furnishing a larger amount of available nutrients to the body than is supplied by either graham or entire-wheat. The available nutrients in the three kinds of flour milled from the same lot of wheat are as follows:

	Protein Per Cent	Carbo- hydrates Per Cent	Calories Per gram
White flour.....	10.2	73.5	3.650
Entire-wheat	9.9	69.3	3.445
Graham	9.8	66.3	3.350

White bread when properly made from a glutinous flour has a high degree of digestibility, and with the exception of some of the oat preparations supplies the body with more available nutrients than is secured from any other cereal.

Bread is not generally subject to adulteration, although various forms of sophistication have been practised. The most common form of adulteration is the use of a small amount of alum with damaged and inferior grades of flour. Occasionally rye bread is in part prepared from wheat flour. Wheat bread also has been prepared from flour of mixed cereals, as corn and wheat. During recent years this practice has practically ceased in the United States owing to national laws regulating the taxing and branding of wheat flours when mixed with other cereals or materials.

During the process of baking, the temperature of the oven may range from 225° to 260° C.; the interior of the loaf, however, does not reach 100° C. Various forms of ovens, heated in different ways and with different kinds of fuel are in use. Modern bake ovens are usually so constructed as to secure the highest efficiency from the fuel consumed and to prevent unnecessary losses of heat by radiation. Some ovens are provided with self-registering thermometers and thermostats for the regulation of the temperature, also devices as trucks, racks, and trays for receiving the bread. The bake-ovens in use in different countries vary widely in form and method of heating. Before stoves were used, bread was baked in special ovens usually adjacent to open fireplaces. In some localities, brick bake-ovens were built out of doors. A fire was made in the oven and when the bricks were sufficiently heated, the coals were removed and the unbaked bread was placed in the hot oven, where it readily baked. This plan of heating ovens is even now in use in some European countries. For home bread-making purposes in the United States stoves provided with bake-ovens are used almost exclusively.

Bread, as offered in the market, is made in loaves of various forms, which usually weigh about one pound. In some countries laws regulating the weight of the bread are rigidly enforced, and bakeries are subject to sanitary inspection. During the process of doughing, flour will absorb from 40 to 60 per cent of water. During the baking process a part of this water is expelled as steam. On account of the additional water absorbed, a pound loaf of bread can be made from .65 to .75 pounds of flour. A barrel of flour weighing 196 pounds will make from 275 to 300 pound loaves of bread, which will contain about 170 pounds of dry material. Since bread readily loses water, allowance is usually made in baking for subsequent shrinkage in weight. Because of greater power for absorption of water, some flours are more valuable for bread-making purposes than are others. The larger the amount of gluten which a flour contains, the greater is the power to absorb water and to produce a large number of loaves per barrel. A low gluten content influences the moisture content of bread more than it does the size of the loaf. Flour which contains a well-balanced gluten can have 10 or even 20 per cent of starch or other material added without influencing the size of the loaf, and on the other hand, the addition of moist gluten to dough does not materially increase the power of expansion or the size of the loaf. Flours which possess poor qualities of expansion are often improved by blending with those of different character. In many larger bakeries, special machinery has been devised for the blending of different qualities of flour. In some bakeries, one kind of flour is used for making the sponge which is then mixed with another kind, in making the dough. Some of the more expensive and higher grades of flour are often used in this way to impart quality to the bread product. Comparative baking trials are made when flours are tested for technical purposes, the same weight of flour, yeast, water, and other materials being used. From the tests the physical properties of the bread are determined, as color, size of loaf, weight, odor, and taste.

Special trade names are given to different kinds of bread. In some bakeries, a bread known as home-made or domestic bread is made. Different kinds of bread are usually due to differences in manipulation, as extent of fermentation, kneading, lightness of dough, etc. For domestic purposes, a moist loaf of good quality is usually preferred to one that is extremely porous and readily dries. Different names are applied to various bread products, as Vienna bread, a high-grade white bread made with yeast, milk, shortening, salt, and in some instances a small amount of sugar. Various other ingredients are sometimes used in bread making, as potatoes, potato starch, potato water, barley water, buttermilk, molasses, etc. These materials take only a secondary part in the process, influencing the taste and flavor more than the composition, unless used in large amounts. The flavor of bread is due to the small amount of ethereal products formed during fermentation by the action of the ferments in the yeast and the soluble ferments or enzymes in the flour. Undesirable as well as the desirable flavoring products are developed during the process of fermentation in case the yeast is of poor quality or the flour is unsound.

BREAD-FRUIT → BREAD-NUT

There are many different kinds of bread made from the different cereals, as pumpernickel, which is made from the graham of rye, flat bread made in large flat cakes without yeast from wheat flour, and baked on the top of a hot stove. This bread is extensively used in the Scandinavian countries. Black bread is used by the peasantry in many European countries.

Aerated bread is made by forcing carbon dioxide through the dough instead of securing a like result by fermentation with yeast, etc., as in the ordinary method of bread making.

For home bread making, Miss Shepperd in her 'Hand-Book of Household Science,' gives the following directions: "Bread with Home-Made Yeast.—One cup of good home-made yeast, one cup of milk and water (one half cup of each) and two level teaspoonfuls of salt. Have the temperature of liquid and flour 75° F. and make into a dough stiff enough to handle without flour, let rise three hours, or until double in size, keeping always at 75° F., and when risen, mold into loaves, let stand one hour and bake." The home-made yeast is made as follows: "Stir one half pint of flour to a smooth batter with one half pint of cold water. Over this pour one quart of boiling water, pouring slowly and stirring rapidly. Place over the fire, and cook four or five minutes. Add two level tablespoonfuls of sugar and one of salt. When cooled to 75° F., add one ounce of compressed yeast, or one pint of home-made yeast. Keep as nearly 75° F. as possible for 24 hours, stirring down once in four or five hours. Keep in a glass jar in a cool place. The jar must be thoroughly washed and scalded before putting fresh yeast into it."

"Compressed Yeast Bread.—To make bread with compressed yeast, break a one-half ounce cake of compressed yeast into small pieces in a cup, and cover with cold water. Place in a bowl one pint of liquid—one half milk and one half water. Make the temperature of the mixture 75° F. Into this liquid put two level teaspoonfuls of salt, stir in a cup of sifted flour; stir the yeast and water in the cup, and pour into this; put in another cup of flour and beat it well. Continue to stir in flour, keeping sides of bowl clean, and kneading with the spoon until nearly stiff enough. Then bathe the hands, wipe them dry, flour the board, and knead the dough until it ceases to adhere to the hands or board, when no flour is used. Grease the bowl with some nice-flavored fat and treat the top of dough after putting into the bowl in the same way. Cover the bowl with a white cloth and allow the dough to rise. See that the air is not cooler or warmer than 75° F. Let the dough rise three hours, or until it is double its original size, knead well and mold into loaves, put in greased pans, grease over the top, let rise one hour, when it will again double its size if properly manipulated, then bake."

These methods of making bread are particularly adaptable to hard wheat flours. For soft wheat flours, other methods in which more salt is used, a longer time allowed for fermentation, and a stiffer dough is made, will be found to give better results. Because of differences in the composition of the various kinds of flour, no directions can be given which are alike applicable to all. The method of bread making which is suited to one flour does not necessarily give the best results with other flours. In fact,

it is necessary to vary the conditions of preparation according to the kind of flour used.

HARRY SNYDER,

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Bread-fruit (*Artocarpus incisa*), a tree of the natural order *Urticaceae*, native of the Indian Archipelago and of the southern Pacific Islands. It attains a height of 30 or 40 feet; is often limbless for half its height, bears leathery, glossy dark green, three- to nine-lobed leaves, one to three feet long; has compact, club-shaped, yellow catkins of male flowers, 9 to 15 inches long, and sub-globular heads of female flowers with spongy receptacles; and usually seedless, spheroidal fruits, at first green, later brown, and lastly yellow, six inches or more in diameter, hanging by short thick stalks singly or in clusters of two or three from the smaller branches. The rough rind is irregularly marked in squares and other figures with raised centres. The unripe fruit contains a milky juice, and when in the edible stage it resembles fresh bread, being white and mealy. It is then slightly tart. Later it becomes yellow, juicy, and tastes of decay. In tropical countries where it has been introduced and particularly in its original home, the fruit is highly valued as a nutritious food, being prepared for use in various ways. When baked it resembles plantain rather than wheaten bread, being sweetish, slightly astringent, but otherwise almost tasteless. When fresh fruits cannot be procured, it is sometimes slightly fermented, beaten to a pasty mass, and so used. Another common way of preparing it is to beat it to a paste with coconut milk and to serve it mixed with bananas, plantains, etc. Since the trees produce two or three crops annually, and since the bearing seasons of different varieties overlap more or less, the fruit may be obtained during the greater part of the year. Not alone for the fruit is the tree valuable; in the South Sea Islands its fibrous inner bark is woven into cloth resembling, but inferior in softness and whiteness, to that made from the paper mulberry which is similarly employed in those islands; the gummy exudation from the bark, boiled with coconut oil is used for caulking canoes, pails, etc.; the beautiful yellow wood is light and soft, but when exposed to the air becomes dark like mahogany, and is used for canoes, furniture, and the interior work in houses. The tree has been cultivated to a slight extent in southern Florida, but the fruits rarely appear even in the most southern markets of the United States, because they do not bear shipment well, and unless used very soon after being gathered become hard and disagreeable in taste. For an account of the introduction of the bread-fruit tree into the West Indies in the last decade of the 18th century, when such feats were more difficult and less common than a century later, see Curtis, 'Botanical Magazine' (pp. 2869-71). A near relative of the bread-fruit tree is the jack (q.v.).

Bread Making. See BREAD.

Bread-nut (*Brosimum alicastrum*), a tree of the natural order *Urticaceae*, a native of the West Indies and closely related to the bread-fruit. The tree, which is very large, bears shining lance-shaped leaves; globose catkins of male and female flowers on different trees; and yields a gummy, milky juice from its bark. The round, yellow fruits (drupes), which are about three inches in circumference, contain each a single

BREAD RIOT IN NEW YORK — BREAKWATER

seed. When roasted or boiled they are used like bread, and, having a flavor which resembles hazel nuts, form a pleasant food. In the United States the tree has not been cultivated.

Bread Riot in New York, The, a riotous demonstration in New York, 13 Feb. 1837. The financial policy of President Jackson had created an era of wild-cat banks, currency inflation, extravagant speculation, and high prices which bore cruelly on the poor, flour being \$12 a barrel, partly owing to a short crop the year before, and other prices in proportion. In New York the general distress was intensified by the great fire of 15-16 Dec. 1835, which destroyed nearly 700 business and other buildings, covering some 13 acres in the heart of the city and occasioning a loss of \$20,000,000. For some time the Jacksonian press had been denouncing the grain dealers as the cause of the famine prices, mentioning especially Eli Hart, the leading commission merchant, and the houses of Meech and Herrick, although as they were commission dealers their stocks were obviously not private hoards. On 13 Feb. 1837, just before Jackson's term expired, these papers announced a public meeting in City Hall Park at 4 P.M., the call being headed "Bread, Meat, Rent, Fuel! Their prices must come down!" The call was signed by eight men, two of whom — Moses Jacques and Alexander Ming, Jr. — were well-known and very violent demagogues. Jacques was made chairman, and with Ming, and others, made furious speeches inflaming the passions of the crowd. Some one at length indicated Hart's store, on Washington Street, between Dey and Cortlandt, as a vast hoard of provisions to relieve their distress, and the crowd surged toward it. The police were swept away and beaten, and although two of the three iron doors held, the centre one was battered in, and the crowd began throwing flour barrels and sacks of grain into the street, staving in and tearing open such as did not burst by their own fall, and as one of the papers remarked, "lowering prices by leaving less on the market." A fresh onslaught by the police was repelled; and it was not till well into the evening that a body of militia dispersed the mob, which by this time had thrown into the street about 500 barrels of flour and 1,000 bushels of wheat, the most of it relieving no one. Herrick's stock was somewhat damaged also, and Meech's store attacked. The disturbance was attributed to the foreigners, but although the two ringleaders were foreign, four of the eight names signed to the call were American, and the natives certainly looked on at the mob without trying to assist the officers.

Bread-root (*Psoralea esculenta*), a leguminous plant with edible, farinaceous tubers. It is the *Pomme blanche* or *Pomme de terre* of the French pioneers. It is common on the higher prairies from Texas through Iowa to Wisconsin.

Bread-winners, The, a brief novel, appeared anonymously in 1883. The kindly interest shown by Alfred Farnham, a retired army officer, in Maud Matchin, the handsome but vulgar daughter of a master carpenter in a western city, turns her head, and she confesses her love to him, which is not reciprocated. Maud's rejected lover, Sam Sleeny, journeyman in Matchin's employ, is jealous of

Farnham. Dominated by Offitt, a demagogue, he joins a labor organization. Farnham loves Alice Belding, who refuses him, but still returns his love. During a strike Farnham organizes patrolmen. The mob attacks his house, and Sleeny assaults Farnham, but fails to kill him. Offitt, who now pays his addresses to Maud, enters Farnham's home, assaults and robs him, and Alice and Mrs. Belding come and nurse him. Offitt turns suspicion to Sleeny, hastens to Maud, and urges her to fly with him. Suspecting, she refuses, gets and reveals his secret. Sleeny, who has been arrested, breaks jail, and at Maud's home meets Offitt and kills him. Sleeny is tried for killing Offitt, and acquitted upon the ground of temporary insanity. The book is a brilliant presentation of the conditions of "labor" at that period. Its authorship was acknowledged in 1902 by John Hay.

Breadalbane, brêd-âl'bân, a district in the western part of Perthshire, in the centre of the Grampians, which here cover a large tract of the county in length and breadth. This district is a complete mixture of high and low hills, yielding pasture for large flocks of sheep and shelter for game, with intermediate valleys, some of which are susceptible of cultivation, while others are merely areas of peat and heath. Loch Tay lies in the centre of the district. Kenmore and Killin are the largest villages.

Breadth, a term in art, used to denote means or effects whereby an artist becomes distinguished for largeness and mastery of treatment. Breadth of style in art is shown in work which gives the impression of these qualities, manifested in simplicity, comprehensiveness, and due subordination of detail. In a work of art possessing the true characteristics of breadth, the eye, passing from one feature to another, takes in, as it were, the whole subject and meaning at a single glance.

Break-Circuit Chronometer, the name applied to a box-chronometer to which a device has been attached for breaking an electric circuit at stated intervals, usually once in two seconds.

Break'er. See COAL MINING.

Breakespere, brāk'spēr. See ADRIAN IV.

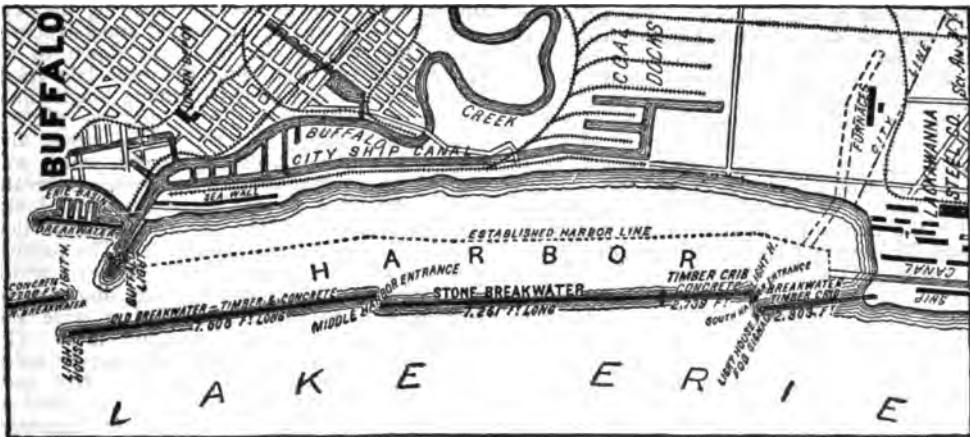
Breaking Bulk, the act of breaking open of a bundle, parcel, etc., and taking the contents, so as to constitute in law a conversion or the like.

Breakwater, an obstruction of any kind raised to oppose the action of the waves, and make safe harbors and roadsteads. The outer mole of the harbor of Civita Vecchia was built by the Emperor Trajan for this purpose; and the piers of ancient Piræus and of Rhodes are of the same class of structures. Herod, it is stated by Josephus, in order to form a port between Dora and Joppa, ordered mighty stones to be cast into the sea in 20 fathoms water, to prepare a foundation; the greater number of them 50 feet in length, 9 feet deep, and 10 feet wide, and some were even larger than these. In the use of such immense blocks of stone, the true principles of constructing a permanent barrier to the waves, appear to have been better understood than they were 17 centuries afterward. Breakwaters are generally solid and made of stone, but there are also floating breakwaters which serve the same purpose. These

BREAKWATER

are built of strong open woodwork, divided into several sections, and secured by chains attached to fixed bodies. The breakers pass between the beams of such a structure as if through a sieve, and in the passage nearly all their force is destroyed. It is estimated that a breakwater of this description will last for 25 years. Stone breakwaters are usually constructed by sinking loads of unwrought stone along the line where they are to be laid, and allowing them to find their angle of repose under the action of the waves. When the mass rises to the surface, or near it, it is surmounted with a pile of masonry, sloped outward in such a manner as will best enable it to resist the action of the waves, or it is covered, as at Plymouth, England, with large blocks of stone, which do not rise high above the surface of the water. Sometimes the breakwater has to be constructed of solid masonry from its foundation. The breakwater at Dover, England, is built in this way, there being no stone in the neighborhood to form a base of the kind described. The most gigantic breakwater ever constructed is that which was erected by French engineers to protect the harbor of Cherbourg. The history of the building of this

base, and 339 feet at the top, the angle of the slope being 60° . This was strengthened by an interior concentric cone, 5 feet 10 inches within the outer one. The frame of each was made of 80 large upright timbers 24 feet long and 1 foot square. On these were erected 80 more of 14 feet in length, making, for the 2 exterior and 2 interior portions, 320 of these uprights. The machine was then planked, hooped, and firmly bolted together. The first cone was built and floated at Havre, then taken to pieces, transported to Cherbourg, and floated off and sunk on 6 June 1784; and the second on 7 July following, in the presence of 10,000 spectators; but before the cavity of this one could be filled with stones, its upper part was demolished in a storm of five days' continuance in August, and the stones it contained were spread over the bottom, interfering with the placing of the next cone. The original plan was to set 90 of these cones, of 150 feet diameter at base, 60 at top, and 65 feet high, in succession, and fill them with loose stones or masonry, and the spaces between them with a network of iron chains, to break the force of the waves. Several modifications of the plan were attempted, the net



breakwater affords an amusing and instructive example of the folly of ignoring experience and the laws of nature. When Louis XVI. appointed commissioners to report upon the best locality for establishing, opposite the English coast, a port and naval arsenal, they recommended the construction of a dike over two miles in length, in water 70 feet deep, in front of the harbor of Cherbourg, by sinking a vast number of ships filled with masonry as a basis, and covering these with heavy stones to within 18 feet of the surface. And when at last four of the ablest naval officers and engineers of France were appointed to execute the work, which was regarded as one of the most stupendous operations, certainly the greatest piece of hydraulic architecture ever undertaken by man, the plan they adopted was one which proved impracticable after having been prosecuted from the year 1784 to 1789, at enormous expense. This plan was the construction of huge truncated cones of timber, which, of the reduced size at which they were actually built, measured 36 feet in height, with a circumference of 472 feet at the

result, after years of labor and an expense of upward of \$6,000,000, being a number of isolated mounds of stone, extending in a crescent for about $2\frac{3}{4}$ miles. In 1830 the work was again taken up, and completed in its present form about 1856. For a full account of this stupendous work, consult Cresy's 'Encyclopædia of Civil Engineering.'

There are many important breakwaters in the United States, and each decade finds an increasing number of them as the demands of trade, and the liberality of the government demands and permits their construction. The latest of these (1903) is the great breakwater at Buffalo, N. Y., built to form a harbor for the immense lake traffic centring at that city. This structure forms the most important section of a long line of breakwaters that extend for $4\frac{1}{2}$ miles along the water-front. At the time that the present work was undertaken there existed the north breakwater, which is built of concrete and extends for 2,200 feet, with a light at its southerly end. Opposite this light and to the westward of it is the northerly end of what is

BREAM — BREARLEY

known as the old breakwater, a timber and concrete structure 7,608 feet long. There is a light at the northerly end of the old breakwater, with a harbor entrance between it and the southerly light of the north breakwater. To the south of the old breakwater is the new structure now being considered. It consists of a stone breakwater 7,261 feet in length, which connects with a timber and concrete structure extending south for another 2,739 feet, with a light at its southerly extremity. Parallel with the previous structure, and slightly to the westward of it, is a timber crib breakwater, 2,803 feet long, which runs northerly from Stony Point. It has a light on its northern extremity, and the opening between this and the last named breakwater forms the south harbor entrance, the opening between the stone breakwater and the old breakwater being known as the middle harbor entrance. The 7,261-foot stretch of the new breakwater is of the rubble mound type, stone-topped, while the southerly end of it, 2,739 feet, is of timber crib construction, to enable vessels to moor alongside of it inside of the harbor.

The new breakwater is built in the open waters of Lake Erie, parallel with the shore, 1,500 feet out from the pierhead line of the harbor, and in 30 feet of water. The first operation was to deposit two parallel ridges of small rubble on the lake bottom, one on the lake side and one on the shore side of the proposed breakwater, the intervening space being filled in with gravel. Another five feet of rubble ridges were added and again filled in with gravel, the mound thus formed being raised to within 10 feet of the surface of the water. The breakwater was then built up for the remaining 10 feet to the surface of the lake by dumping upon it large rubble stones. The slopes of the structure were covered with a revetment of large stones, lowered into place in close touch with each other, so as to completely cover the rubble stone, the object of these heavy quarried stones being to prevent displacement of the rubble by the action of the water. Then came the important work of covering the mound with large capping stones, quarried to prescribed dimensions, many of the stones measuring as much as six feet in thickness. These stones were carried out by five large floating derricks, each with a lifting power of 20 tons. The capping stones were laid snugly together, the finished top and side of the breakwater presenting a fairly even and true appearance. The illustration shows very clearly the way in which the top of the breakwater is finished, the heavy top angle stones serving by their weight and friction to prevent the heavy seas from taking hold of the rubble mound, loosening it and washing it away. A cross section of the breakwater as thus constructed shows it to be normally about 140 feet wide at the bottom and 14 feet wide at the top.

While the masonry breakwater was being constructed, the work of building the timber-crib structure was also going on apace. As compared with the rubble-mound type, the timber and concrete form has the advantage of being cheaper in construction. In building it the first step was to prepare a foundation and for this purpose a powerful clam-shell dredge built especially for the work was used to dredge a trench along the line of the breakwater in the

bottom of the lake 95 feet in width, and 50 feet in depth through the clay. Then through the centre of this trench another excavation was dredged out which was 50 feet in width and extended everywhere to solid rock. The next task was to fill in the trench thus formed with gravel which was brought to the spot in scows and dumped in, a bed of gravel 30 to 40 feet in depth being formed in this way. Upon this was placed an embankment of rubble stone eight feet high, which formed a foundation for the timber cribs. These cribs were built of sawn timber and were 36 feet wide, 22 feet high, and from 60 to 180 feet long. They were towed to position over the foundation and sunk by loading with stone. The superstructure was built in 3 benches, the first 6 feet, the second 10 feet, and the third 12 feet above the mean water level of the lake. Each bench was 12 feet wide. As shown in the illustrations, a certain portion of the crib breakwater, as finished, is of this construction; but the larger portion of it has been capped with concrete. This was done to strengthen the structure, the heavy gales of 12 Sept. and 21 Nov. 1900, in the latter of which the wind reached a velocity of 80 miles an hour, having loosened up and broken the above-water timber coping and finish. In repairing the ravages of the storm, the damaged superstructure was removed and the cribs cut down to an elevation of two feet below the mean lake level. Upon this, concrete blocks, forming longitudinal and cross walls, were placed, and the pockets thus formed filled in with rubble stone, and roofed in with heavy concrete work, which was carried up to the level of the original breakwater. In place of the three benches of the crib superstructure, the reconstructed portion shows a parapet and a banquette. The parapet which is exposed to the lake side covers a width of 27 feet and its crest is 12 feet above mean lake level. The banquette is 8 feet wide and is uniformly 4 feet above the lake level. The new breakwaters have taken some six or seven years to construct, and the cost has been \$2,200,000. Consult: 'Reports of the Chief of Engineers U. S. A.'; Spon, 'Dict. of Engineering'; Stevenson, 'The Construction of Harbors'; De Cordemoy, 'Les portes modernes.'

Bream, a sluggish fresh-water fish (*Abramis brama*) of the carp family, common in European lakes and rivers, and especially numerous in the English fens, where it finds all the conditions most favorable, and reaches a weight of seven or eight pounds. It is edible, but too lethargic to afford sport. Another species (*A. blicca*), is smaller, silvery white, and a favorite with those who enjoy quiet angling. In the United States the term "bream" is given rather indefinitely to several minnows and sunfish; and to various marine fishes, better known as sea-breams (q.v.).

Brearley, William Henry, American journalist and author: b. Plymouth, Mich., 18 July 1846. He served in the Michigan infantry during the Civil War, was connected with several Detroit papers 1870-92; founded the Detroit Museum of Art 1883. He has published 'Recollections of the East Tennessee Campaign'; 'Wanted, a Copyist'; 'Leading Events of the American Revolution.'

BREAST—BREATHING AND HEALTH

Breast, in female animals, a glandular structure, containing vessels for the secretion of milk, and excretory ducts, which open by small orifices in the nipple, and discharge the secreted fluid for the nourishment of the child. At the centre of each breast there is a small projection, the nipple, and this is surrounded by a dark ring termed the areola. The nipple is the part which the infant seizes in its mouth, and through the passage of which the milk flows into the mouth of the child in the act of suction. The glandular structure of the breast is covered by fat, except at the forepart of the nipple and the integument. The breast is liable to many diseases, from irritation during nursing, bruises of the part, undue pressure from tight clothes, and from constitutional causes. Inflammation of the breast is very common during nursing, or from a superabundant secretion of milk. After delivery, the nourishment of the infant being from the breast, there is an increased determination of blood to that part to enable it to perform the necessary function, and thus, when there is any cause of irritation, there is a tendency to increased action in that part, which frequently terminates in inflammation. Lacteal swelling is another troublesome disease of the breast. It is confined to the nipple, and consists of a large collection of milk in one of the lactiferous tubes, the orifice of which has been closed from inflammation. See MAMMARY GLANDS.

Breast-wheel. See WATER-WHEEL.

Breasted, James Henry, American Egyptologist: b. Rockford, Ill., 27 Aug. 1865. He studied at Yale and Berlin, and has been a professor of Egyptology and Semitic languages at the University of Chicago from 1894. He has published 'An English Edition of Erman's Egyptian Grammar' (1898); 'De Hymnis in Solem sub Rege Amenophide IV. Conceptis' (1894); 'A New Chapter in the Life of Thutmose III.' (1900).

Breastplate, a piece of defensive armor covering the breast, originally made of thongs, cords, leather, etc. (hence *lorica*, *cuirass*), but afterward of brass, iron, or other metals. It may be considered as an improvement of the shield or buckler, which was borne on the left arm, and moved so as to protect successively all parts of the body. It being perceived that the free use of both hands in the employment of offensive weapons was important, the defensive armor was attached to the body, and received different names from its position, use, etc., as for instance, breastplate, cuisses, greaves. These different species of defensive armor are of little use against firearms, and have therefore generally fallen into disuse in modern war. (See *CUIRASS*.) Breastplate, in Jewish antiquity, was a folded piece of rich, embroidered stuff worn by the high-priest. It was set with 12 precious stones bearing the names of the tribes. It was also called the breastplate of judgment, because it contained the Urim and Thummim.

Breastwork, in the military art, every elevation made for protection against the shot of the enemy. Wood and stone are not suitable for breastworks, on account of their liability to splinter. The best are made of earth; in some circumstances, of fascines, dung, gabions, bags of sand, and of wool. The thickness of the

work must be in proportion to the artillery of the enemy. In general it ought not to be less than 10, nor more than 18, or at most 24 feet thick. The rule of Cugnot is, that the breastwork should be so high that nothing but the sky and the tops of trees can be seen within cannon-shot from the interior of the intrenchments. If this rule cannot be followed on account of the height of neighboring mountains, the interior of the fortification ought to be secured by traverses.

Breath (A.S. *bræd*, odor, breath). The ordinary breath has a slight odor, and contains nitrogen, oxygen, carbon dioxide, ammonia, water, and organic impurities. In quiet breathing, it probably never carries microbes. In diseases of the mouth, and teeth, nose, throat, lungs and stomach, in constipation, and in fevers the breath may become offensive. Should a simple antiseptic mouthwash or a laxative fail to remove the trouble an underlying disease must be sought out and treated. A suitable mouthwash is Dobell's solution or listerine. Deodorizers, like coffee, cardamon, cloves, etc., may be resorted to for temporary sweetening of the breath, but they have little effect in permanently removing the condition.

Breathing and Health. Essential to continuance of physical being are food, water, and air, and the most important is air. The supply of food may be cut off for days or weeks and life remain in the body. The quality may be poor and amount reduced, and, while it affects health and perhaps reduces strength, life will not go out for a long time. Cut off the supply of air completely for 14 minutes and life becomes extinct. Change from purity of air to that which is only slightly contaminated and in an hour vitality lessens. Headache and nausea appear, and unless there is return to fresh and pure air, disintegration of tissue and physical break-down follow. These facts are patent to all, and are referred to as a starting point to consider how breathing may be used for the establishment and continuance of perfect health. The diseases most dreaded by the medical fraternity are those of a pulmonary nature. They are, in many cases, the result of insufficient air supply and inefficient means of securing it. Diseases affecting digestion follow close upon those relating to the lungs, and these, too, can be regulated by and through breathing. Nervous disorders, likewise, succumb very readily when breathing is properly ordered.

The act of breathing is, then, so important that it should have the attention of every individual. To use it to its best advantage every one must know something of its action and of the parts directly affected by it. There is instinctive breathing and mentally directed breathing. Every one breathes. Instinctive breathing begins at birth and continues through life. If we could always be in fresh air and have little to do we would need no more knowledge of the operation than has any animal. Even for great physical activity instinctive breathing would be sufficient, because every physical exertion would increase the rapidity and breadth of the instinctive act. But we are thinking animals, and we live in conditions requiring more than ordinary physical action. Excitement, nervous movements, high living, and attributes of mind cause us to throw off poisons and gases which the

BREATHING AND HEALTH

breathing apparatus must take care of. To dispose of these we must go beyond instinctive breathing and adopt mentally directed action.

Breath is air taken through the nose and mouth into the lungs, which are elastic sacks made of microscopic vessels suspended on the bronchial tubes in the chest. They expand and collapse as they are acted upon by organs made of muscle. When they expand they draw air into the body; when they collapse they expel air. The muscles which operate them are those of the chest. The chief one is the floor of the chest, called the diaphragm. Those next in importance are the costal muscles, located in the ribs. The next, the dorsal muscles, located in the back. Last, the pectoral muscles in the upper chest in front. The muscles already noted are those which dilate the lungs and draw air into the body. Their action produces inspiration of breath, and that action expands the chest. Their return to normal position permits the collapse of the air-cells of the lungs. Such return is, however, insufficient to cause complete collapse of air-cells and the expulsion of all air. Return is assisted, and expulsion made complete, by calling into use the abdominal muscles and those in the ribs below the diaphragm. It becomes, then, very important to know the location of the diaphragm. This organ is attached in front to the end of the breast bone. One should find this location by pressing with his fingers. Men find it easily because the ribs spread quickly where they leave the breast bone. Women find it less easily as the ribs are close together. But follow up to the point where the very end of the breast bone is located. The diaphragm attaches at the sides to the ribs. One can tell where by placing the hand flat on the side and inhaling a deep breath; that which pushes first against the hand from within is the diaphragm, which is from one to two inches lower than the level of the end of the breast bone. It attaches to the sides all around and into the small of the back, where it is a little lower than at the sides. One should study the location of the diaphragm day after day, until it is definitely fixed in mind. Many who have supposed they knew how and where to take breath by using the diaphragm will find their conception has been that it is lower than it is. The real reason for having the correct location clearly in mind is to avoid desultory and, possibly, harmful practice. The reason for repeating the examination of location so many times is that the mind may go instantly to it in order to direct voluntary inspiration and expiration. Another common error is to suppose the lungs to be located in the upper chest. Ask one if his lungs are sound and he will pound high in front. The largest portion of the lungs is in the sides and back. He pounds over the space occupied by the heart. This common error leads many who practise voluntary breathing into misdirected effort, which is liable to be harmful.

Breathing divides into inspiration and expiration. Inspiration (breath taking) is instinctive and involuntary. The latter is like the former, but it is greatly amplified and extended. Our attention now goes to voluntary inspiration. Its primary physical act is expansion of the diaphragm. Evidence of that is discovered wherever that organ connects with outer parts of the chest, in the generous expansion of those parts, and by quite a little expansion of parts of the body

below the diaphragm. The latter action is caused by the pressure of the centre of the diaphragm (quite in the middle of the body) downward upon the abdominal viscera. Deep breathing, or taking large draughts of air, is always accompanied by generous spread of the body at the level of the diaphragm, and considerable spread of the portion just below that level. Few adults will do this upon the first attempt at mental direction of inhalation, because they have lost the natural habit. If they will study for a few minutes quiet instinctive (not directed) breathing, they will find they really do breathe as described above. But this is not enough for "breathing for health." It must be amplified through mental direction; on the line of instinctive breathing, only much more extensively.

The custom of taking deep breath can be developed into habit in a short time, and it should be used daily. Direct the thought during inhalation to generous expansion of the body in the neighborhood of the diaphragm, and after such expansion has begun, enlarge the sides and back above the diaphragm. Fill the lungs fully, retain the air a few seconds and exhale completely. Such complete exhalation implies that breath shall be forced out by drawing in the abdomen. After repeating the act of inspiration and expiration four or five times, which, by the way, should never be done violently, one can feel the more active rush of blood through the body. This demonstrates that the cleansing process of the circulatory system is accomplishing its work. When a good glow is established refrain from further exercise for the time, but resume it when quietness is again restored. Five or ten minutes given to this practice every morning and evening will, in a month, establish physical strength. Followed through a term of years it will rebuild the body and make it almost invulnerable against the attack of disease. Persons with weak lungs or sluggish circulation can, by this means, become rugged and very active. So far-reaching is the result that great physical strength is acquired. Even the usually expected elements of decay, as manifested in carious teeth and falling hair, are arrested or prevented. The success of all physical treatment lies in the regularity and persistence with which it is followed. In a few weeks or even in one week, the benefit will be observed, but the rebuilding of a body requires persistent practice for a year at least.

Practice of the above nature increases the lung space. Probably no new air-cells can be created, although some authorities claim that there are. The expanding power of existing air-cells is enlarged, and the muscles which cause the expansion greatly increase their power. Such expansion can be measured. It is well to take the bust measure, passing the tape-measure around the body just below the arm pits, and take measurement on the first day of each month thereafter. Comparison with previous measure will show constant increase for a full year. How great an increase to expect depends upon the person. From two to five inches in a year is usual. A more perfect measure of development is given by the spirometer which, as its name implies, is a breath-measure. It records the vital capacity of the lungs. Test measurements in over 500 students proved that every one gained in size of lungs, and many made marvelous changes in their physical condition. The spirometer records the cubic inches of air space

in the lungs. Such capacity varies in accordance with the height, and is greater in men than in women. Tall people have largest lungs, ordinarily, and those who are slim, rather than stout, increase most through practice. Records show that the increase in air capacity in one year averages from 25 to 33 per cent. All this has direct bearing on health. In the lungs the air-cells are surrounded by minute blood vessels. All the blood, after its course through the body, passes to the lungs to discharge its gatherings and to receive the supply of oxygen necessary for life. It is evident that if the air supply is increased 25 per cent, cleansing and oxygenation take place more quickly and more thoroughly. It is recognized among physicians that the purity of the blood is the most important element in keeping well. Meeting the attack of bacilli is the triumph of medical science. The germ of disease is found in the blood, and in modern science inoculation for destroying such germ is the keynote. In the practice of breathing every individual has nature's method of doing what medical science does. It goes beyond that, in that breathing provides prevention as well as cure. The ounce of prevention is the most valuable. Disease germs can hardly find lodgment, and they certainly cannot propagate, in a body which is perfectly well. A feeling of lassitude and "run down" is the admonition which shows that germs are at work. Your doctor tells you to take long walks in the open air. He says in other words that oxygen must be supplied to the lungs. Much surer are we to respond to health-laws if such training as all can have has made the taking of large draughts of air possible.

Above we have described inhalation and exhalation. While we have not sought to formulate a complete system of training, we have given enough to show what may be done. At first, daily practice should be gentle. This will bring into correct use all physical organs which govern breathing. When one realizes ease in action he should make the dual act of inspiration and expiration more generous. Expiration should now be made more complete. That is, make exhalation forceful by drawing in the abdominal muscles and lower ribs greatly. This will also cause broader inspiration. Thus the two sets of muscles will be powerfully increased, and the expanding power of the lungs will be enlarged.

When breath is imbibed in large quantities it should be retained a little time that it may purify the blood. Three or four seconds are long enough at first, but the time may be increased gradually until one can hold it 30 or more seconds. The physical act of holding the breath consists of arresting the inspiratory muscles when they have drawn breath in and refusing to allow them to return to their relaxed position. The very act of thus commanding adds to their strength. It is one of the contributing factors toward strengthening the whole body. The tendency of modern life to greater physical activity accentuates the need of symmetrical development of the lungs and their controlling forces.

FRANK HERBERT TUBBS,
Editor 'Music Life.'

Brébeuf, Jean de, zhōn dé brā-béf, Jesuit missionary: b. Bayeux, France, 25 March 1593; d. 16 March 1649. He set sail in 1625 with Champlain, arrived at Quebec when but a single house was seen there, and fixed his residence

among the Hurons. He learned their language, and gained their confidence. In 1649 they were suddenly attacked by the Iroquois, and Brébeuf fell into the hands of the latter, by whom he was put to death with frightful tortures. His 'Catechism Translated into the Language of the Hurons' was published at Paris in 1652.

Breccia, brĕ'cha, a conglomerate composed of angular pieces of the same or of different rocks, united by a cement or matrix, which, according to its nature, forms the several varieties of calcareous, silicious, etc. The conglomerate known by the name of pudding-stone differs from that of breccia only in having the composing fragments rounded. Calcareous breccia is often found in the form of fine marble, apparently composed of fragments produced by some disrupting force, and then united by the infiltration of carbonate of lime among them. The angular form of the fragments seems to indicate that they have never been exposed to much friction, and have therefore probably originated at no great distance from their present site. In some cases a kind of spurious breccia has been formed by the breaking up of calcareous beds, and their subsequent union by means of infiltration, without any change of their original position. Marble breccia thus formed is remarkable for the size of its fragments. In the calcareous districts of many countries caverns and extensive fissures are seen filled with a reddish mass, composed of lime, sand, and oxide of iron, enclosing angular fragments of different rocks, and a great number of bones more or less broken. To such masses the name of osseous breccia has been given. They are most frequently met with on the shores of the Mediterranean.

Brèche de Roland, brĕsh dé rô-lân, "the breach of Roland," a defile in the Pyrenees, between France and Spain, which, according to a well-known legend, was opened up by Roland, one of the paladins of Charlemagne, with one blow of his sword Durandal, in order to afford a passage to his army. It is an immense gap between the walls of a mountain barrier rising to the height of 9,500 feet above the level of the sea, and from 300 to 600 feet above the bottom of the defile. The defile itself varies in width from 200 to 300 feet. It lies about 43 miles north of Huesca, from which it can at times be seen.

Brechin, brĕh'n, a parliamentary and municipal burgh of Scotland, in Forfarshire, is romantically situated on the left bank of the South Esk, 12½ miles northeast of Forfar, and eight west of Montrose. It is a very ancient royal burgh, and was formerly walled. The chief industry is the manufacture of linens, and the neighborhood exports a considerable quantity of grain. In ancient times there was an abbey of Culdees in this place, and in 1150, when Brechin was constituted an episcopal see by David I., it is supposed that the site of this establishment was that chosen for the foundation of the cathedral. The cathedral church of St. Ninians, which now forms the parish church, is situated on the north edge of a precipitous ravine, which separates the burgh-lands from those of Brechin Castle. The ancient round tower, which is the leading architectural feature of the town, stands at the southwest angle of the church. Such towers are common

BRECK — BRECKINRIDGE

in Ireland, but are seldom seen in Scotland. The Mechanics' Institution is a handsome building, with a beautiful hall, and there is a valuable public library.

Breck, James Lloyd, American clergyman: b. Philadelphia, 27 June 1818; d. Benicia, Cal., 30 March 1876. He graduated at the University of Pennsylvania in 1838, and at the General Theological Seminary, New York, in 1841. The same year he went to Wisconsin, and aided in the formation of the diocese there in 1847. He was one of the founders of the Nashotah Theological Seminary, remaining as instructor there until 1850, when he went to St. Paul, Minn., as a missionary. There he established an associate mission, and assisted in supplying mission stations for 80 miles around. From 1852 to 1857 he was engaged in missionary work among the Chippewa Indians. In 1858 he established church services at Faribault, Minn., and founded the Seabury Divinity School. He prepared the way for building church institutions there, and was the forerunner of Bishop Whipple. In 1867 Dr. Breck went to Benicia, Cal., where he established church enterprises similar to those at Nashotah and Faribault.

Breck, Samuel, American soldier: b. Middleborough, Mass., 25 Feb. 1834. He is descended from Edward Breck, who came to Dorchester, Mass., from Ashton, England, about 1630. He graduated at West Point 1855, and took part in the Seminole war of 1855-6. During the Civil War he was assistant adjutant-general of McDowell's division, and afterward of the 1st Army Corps, being engaged in the occupation of Fredericksburg and in the Shenandoah Valley expedition, to intercept the retreat of the Confederate forces under Gen. Jackson in 1862. From July 1862 to 1870 he was assistant in the adjutant-general's office at Washington, in charge of rolls, returns, books, blanks and business pertaining to the enlisted men of the regular and volunteer forces, and engaged in the preparation and publication of the 'Volunteer Army Register.' He became brigadier-general and adjutant-general in 1897, and was retired by operation of law, 25 Feb. 1898.

Breck'enridge, Hugh Henry, American artist: b. Leesbury, Pa., 1870. In 1892 he was awarded the European scholarship of the Pennsylvania Academy of the Fine Arts, and studied in Paris under Bouguereau, Ferrier, and Doucet. Since 1894 he has been an instructor, and secretary of the faculty in the Pennsylvania Academy of the Fine Arts, and in 1898 organized the Darby School of Painting. His work was awarded a medal at Atlanta in 1895, and received honorable mention at the Paris Exposition of 1900.

Breckinridge, Minn., a village and county-seat of Wilkin County, on the Red River of the North, about 50 miles south of Fargo, North Dakota. It is reached by the Northern Pacific and Great Northern railroads and is the centre of a very fertile region. It contains flour mills, grain elevators, etc., and steamboats ply between it and the Red River towns in Manitoba. Pop. (1910) 1,840.

Breck'inridge, Clifton R., American legislator and diplomatist: b. Lexington, Ky., 25 Nov. 1846. He is a son of John Cabell Breckinridge (q.v.), and received a public school edu-

cation and served in the Confederate army and navy. After the war he attended Washington College (now Washington and Lee University) for three years, and engaged in mercantile business in Pine Bluff, Ark. He was elected to Congress in 1882 as representative-at-large, as a Democrat; was re-elected in 1884, 1886, 1889, 1890, 1892 and 1894, and served on the Committee on Ways and Means during the greater part of his congressional life. He was United States Minister to Russia 1894-7.

Breckinridge, or Breckenridge, John, American statesman: b. Augusta County, Va., 2 Dec. 1760; d. Lexington, Ky., 14 Dec. 1866. In 1795 he was made attorney-general of the new State of Kentucky, and he served in its legislature from 1797 to 1800. He entered the United States Senate in 1801, becoming four years later attorney-general in Jefferson's cabinet, in which office he died.

Breckinridge, John, American clergyman: b. Cabell's Dale, Ky., 1797; d. 1841. He entered the Presbyterian ministry, and was chaplain of the National House of Representatives, 1819-21. He was pastor at Lexington, Ky., 1823-6, and in Baltimore 1826-31. He was subsequently professor of theology at Princeton Theological Seminary, and was chosen president of Oglethorpe University, Georgia, just prior to his death. He is remembered for a famous theological debate held with Rev. John Hughes, subsequently archbishop of New York, published under the title 'Roman Catholic Controversy' (1836).

Breckinridge, John Cabell, Vice-President of the United States, grandson of John Breckinridge (1760-1866, q.v.): b. near Lexington, Ky., 21 Jan. 1821; d. Lexington, Ky., 17 May 1875. He practised law in Lexington until 1847, when he was chosen major of a volunteer regiment for the Mexican war. He sat in Congress in 1851-5, and in 1856 was elected Vice-President, with James Buchanan as President. In 1860 he was the pro-slavery candidate for the presidency, but was defeated by Abraham Lincoln. A United States senator from March to December 1861, he then entered the Confederate army, was appointed a major-general in 1862, and held some important commands during the Civil War. He was secretary of war in Jefferson Davis' cabinet, at the close of the struggle, and escaped to Europe, whence he returned in 1868, and resumed his law practice.

Breckinridge, Joseph Cabell, American military officer, nephew of John Cabell Breckinridge (q.v.): b. Baltimore, Md., 14 Jan. 1842. He practised law in Danville, Ky., till the beginning of the Civil War, when he joined the Union army. He was made a first lieutenant in the regular army 1863, captain in 1874, brigadier and inspector-general in 1889, and major-general of volunteers, 4 May 1898. He served in the Santiago campaign and had a horse shot from under him.

Breckinridge, Robert Jefferson, Presbyterian clergyman and theological writer, brother of John Breckinridge (1797-1841, q.v.): b. Cabell's Dale, Ky., 8 March 1800; d. 27 Dec. 1871. He was originally a lawyer. He was president of Jefferson College in 1845-47; from 1847 he was pastor at Lexington, Ky. He was an old-school leader in the division of the Presbyterian

Church in 1837 into Old and New schools. He was a strong supporter of the Union during the Civil War. His chief works were 'Knowledge of God, Objectively Considered' (1857); 'Knowledge of God, Subjectively Considered' (1859).

Brec'on, or Brecknockshire, a county of South Wales, with an area of 719 square miles; pop. about 60,000. It is one of the most mountainous counties of the principality, and presents much bold and magnificent scenery. Near its centre rises the mountain called the Van or Beacon, belonging to the Black Mountains, which traverse its southern portion. It has a height of 2,901 feet, and is the culminating point of South Wales. The river Wye forms a natural boundary between this county and Radnor, and the Usk, rising in the Black Mountains, crosses the county and flows through a fine valley toward the town of Brecon. About two miles east from the latter is Brecknock Mere, one of the largest lakes in South Wales, abounding in otters, pike, tench, perch, and eels. A considerable quantity of agricultural produce is sent to the markets in the neighboring English counties. The chief manufactures are coarse woollens, stockings, and other worsted stuffs; there are also extensive ironworks. Chief towns, Brecon, Builth, Crickhowell, Hay, and Llanelli.

Brecon, or Brecknock, Scotland, the capital of Brecknockshire, stands in an open valley at the confluence of the Honddu and Usk, and consists chiefly of three principal and several minor streets. Three bridges span the Honddu and one the Usk. The principal edifices are the county hall, county jail, barracks, Christ's College (an important educational institution on the model of the large public schools), the Independent Theological College, and several of the places of worship. St. John's Church is a fine old building, cruciform, with a massive tower, partly early English, partly in later style. At Brecon the celebrated actress, Mrs. Siddons, was born.

Breda, Jan van, yán vān brā-dā', Flemish painter: b. Antwerp, 1623; d. 1750. He studied at first under his father, who had acquired some reputation, but afterward became a close imitator of Breughel de Velours and Wouvermans, of whose works he made copies, which the most practised eye is scarcely able to distinguish from the originals. He resided several years in England, where he enjoyed a high name, and was much employed by the king and the nobility. On his return in 1725 he was appointed director of the Academy of Antwerp, and was so highly valued by his townsmen that his paintings were often the objects of keen competition.

Breda, Holland, a town in the province of North Brabant, 24 miles southwest of Bois-le-duc, on the Merk, being a strong frontier fortress, it was formerly of the greatest importance to Holland, as the chief point of the line of fortresses in front of the Meuse. The fortifications consisted of 15 bastions, as many ravelins, and five horn-works, besides the citadel. These being removed, the chief strength of the place now lies in its marshy environs, which may easily be laid under water. Breda received city rights in 1534; and since that time has often been a subject of contention between the Dutch, Spaniards, and French. It was delivered by treachery into the hands of the Duke of Parma

in 1581, but was retaken by Maurice of Orange in 1590. The latter capture was accomplished by means of a boat loaded with turf, in which 70 Dutch soldiers were concealed. Spinola took Breda in 1625, after a siege of 10 months, but it was retaken by the Dutch under Frederick Henry of Orange, in 1637. During the French Revolutionary War Dumouriez made himself master of the city and fortress in February 1793, and would thereby have prepared the way for the conquest of Holland had he not been forced, by the loss of a battle at Neerwinden, to evacuate the city and fortress, 4 April. In September 1794 Breda was attacked by the army of Pichegru, but did not surrender till all Holland was conquered, in the winter of 1794. On the approach of the Russian vanguard, under Gen. Benkendorf, in December 1813, the French garrison made a sally, and the patriotic citizens, profiting by the occasion, rose *en masse*, shut the gates, and prevented the French from returning into the town. A peace was concluded at Breda between England and Holland in 1667. Pop. about 28,000.

Breda, Declaration of, a proclamation of amnesty issued by Charles II. of England, 4 April 1660.

Bredahl, brā-dāl', **Christian Hviid**, Danish poet: b. Hellestrup, 1784; d. 1860. He was educated at the gymnasium and the university of Slagelse. Owing to his love for an out-door life, he turned his attention to agriculture and in 1824 he bought a small piece of land near Sorø, which he cultivated himself. His great work is 'Dramatic Scenes,' which was published in six volumes, the first volume appearing in 1819. He also published several polemical works, directed against the Danish romanticism and the realistic writings of the time. In all his works, he shows a love for nature and the natural conditions of life, and a dislike for modern culture; his 'Dramatic Scenes' attacks both the nobility and the priesthood.

Breden, brā-dēn, Christine (ADA CHRISTEN), Austrian poet: b. Vienna, 6 March 1844. She was at first an actress, but in 1864 settled in Vienna and began her literary career. In 1873 she married Adalmar Breden, but still used her pseudonym. Her first publication was a collection of poems entitled 'Lieder einer Verlorenen' (1868); her other works include 'Treasures'; 'Our Neighbors'; 'The Virgin Mother, a Story of the Vienna Suburbs' (1892); a novel, 'Ella' (1873); and a drama, 'Faustina' (1871).

Brederode, brā'de - rō - de, Hendrick (COUNT), Dutch patriot: b. 1531; d. 1568. He joined with Counts Egmont and Horn in opposing the tyranny of Cardinal Granvella, the Spanish governor of the Netherlands. In 1566, he presented to Margaret of Parma, who had succeeded Granvella, the famous 'Request,' which gave rise to the insurrection of the *Guerra*, or 'Beggars.' Under the grinding oppression of the Duke of Alva's administration in the Low Countries, he was obliged to retire to Germany.

Brederoo, Gerbrant Adriaenszoon, gār-brānt ā'drē-ān-zōn brā-dā'rō, Dutch dramatist and poet: b. Amsterdam, 16 March 1585; d. there, 8 July 1618. His best poems are 'The Meditative Song Book' and 'The Great Fountain of Love,' collections of grave and gay pieces, all of which have been very popular, and

BREDOW — BREEDING

since his time often reprinted. His lyrics are admired for their musical verse and their tender sensibility; but his masterpiece is unquestionably the 'Jerolimo' ('Spaansche Brabander Jerolimo'), a comedy based upon a French version of one of Mendoza's plays. Another comedy, 'Moortje,' is an adaptation from Terence. See Ten Brink, 'Gerbrand Adriaenszoon Brederoo' (1859).

Bredow, Gabriel Gottfried, gä'brī-əl göt'frēd brā'dō, German historian: b. Berlin, 14 Dec. 1773; d. Breslau, 5 Sept. 1814. He was for a time professor at Eutin, and a colleague of the celebrated Voss; afterward professor at Helmstädt, and still later at Frankfort-on-the-Oder, whence he went to Breslau on the removal of the university to that place. He was distinguished for his patriotism and his literary works. His 'Handbuch der alten Geschichte' (Manual of Ancient History) passed through five editions, the fifth of which appeared in 1825. He was the author of 'Chronik des Neunzehnten Jahrhunderts' (Chronicle of the 19th Century); 'Epistolæ Parisienses'; 'Untersuchungen über Geschichte, Geographie, und Chronologie' (Researches in History, Geography, and Chronology); and of the very useful 'Historische Tabellen' (Historical Tables), which were translated into English.

Brée, brā, Matthæus Ignatius van, Belgian painter: b. Antwerp, 1773; d. there, 1839. He chiefly excelled in historical painting, for which he gained a prize in 1797. His characteristics are said to have been originality and vigor of conception and patience in execution, yet he worked with great rapidity, as he presented to Napoleon in a few hours a tableau of the manoeuvres of the fleet on the Scheldt before Antwerp. His first work which attracted attention was the 'Death of Cato.' Among his principal works are 'Rubens Dictating his Dying Testament'; 'The Tomb of Nero at Rome, with a group of Itinerant Musicians and Lazzaroni'; 'Death of Count Egmont'; 'Van der Werff Addressing the Famished Populace During the Siege of Leyden in 1576'—the burgomaster is represented as saying, "Take my body and divide it amongst you." Van Brée had the title of painter to the Empress Josephine, and represented many scenes connected with the French occupation of Belgium. He replaced Herreyns as director of the Academy of Fine Arts at Antwerp, and gained a high reputation by his teaching. He also evinced a capacity to excel in sculpture and lithography.

Breech and Breech-loader. The breech of a gun is that portion of a gun immediately behind the bore, and which in modern small-arms and artillery is removed to enable the process of loading to be effected. The chief advantages of this method, over muzzle-loading, are that it greatly increases the quick-firing capacity of the weapon, and adds to the length of range and accuracy of aim, while affording much facility for cleaning. Though it has only been successfully adopted in quite modern times, the breech-loading principle is nothing new, as some of the earliest cannon were so constructed. The first weapon of this description utilized as a regular military arm was the needle-gun adopted by the Prussian government so long ago as 1841, though its efficacy and superiority for warlike purposes was not demonstrated till the success-

ful campaigns of Prussia against Denmark and Austria in 1864 and 1866. Other nations also speedily armed their troops with breech-loading rifles, the French having adopted the Chassepôt breech-loader in 1866, and in Britain the old Enfield rifle having been converted into a breech-loading weapon and supplied to the troops the same year. In 1871 the Snider or converted Enfield began to be superseded by the Martini-Henry rifle, and this again has been superseded in the British army by the Lee-Metford magazine rifle. Other European nations have also adopted different forms of breech-loading rifles. The principle of breech-loading has also been applied to artillery, the names of Armstrong and Krupp being associated with some of the first modern guns of this type. See ARTILLERY; MUSKET; RIFLE; SMALL ARMS.

Breeches, a garment for the legs, especially, as distinguished from trousers, for covering the upper portions of the legs. In England they were formerly called hose. Breeches or hose were in use even among the ancient Babylonians, and with them were made so as to cover the foot and supply the place of stockings. In Europe we find hose first used among the Gauls, hence the Romans called a part of Gaul breeched Gaul (*Gallia braccata*). In the 5th century they had become fashionable in Rome. In the time of Queen Elizabeth and James I. the breeches had assumed enormous dimensions, being stuffed out with various materials, as wool, hair, etc. King James' partiality for such breeches is well known, and we find him represented in an old engraving with wide stuffed breeches tapering to the knee, slashed and adorned with lace. In the reign of Charles I. they took the form of short trousers, loose at the knee, and ornamented with ribbons, lace, etc. In the time of William III. the tight knee-breeches came in, and have been supplanted by trousers only in the 19th century.

Breeches Bible, a name given to a Bible printed in 1579; and so called from the reading of Gen. iii. 7: "They sowed figge tree leaves together and made themselves breeches." As a matter of fact this Bible has no more distinctive right to the name than Wyclif's version, in which the same words are also found.

Breeches Buoy. See LIFE SAVING SERVICE.

Breeching, a rope used to secure the cannon of a ship of war, and prevent them from recoiling too much in the time of battle. It is of sufficient length to allow the muzzle of the cannon to come within the ship's side to be charged.

Breede, brā'dē, a river in Cape Colony, which rises in the Warm-Bokkeveld, and flows chiefly in a southeasterly direction through the district of Zwellendam, entering the Indian Ocean at St. Sebastian's Bay, about 60 miles northeast of Cape Agulhas, the most southerly point of Africa. It is navigable for vessels drawing not more than 10 feet of water to a distance of 40 miles, and drains a very fertile district.

Breeding, the process of procreation as applied to any or all classes of organisms. In this article the term is largely used to describe the breeding of domesticated animals. Originally the different variations of types or breeds had their origin in the accident of circumstance

BREEDING

and the natural tendency of all animal life toward variation; but since man began to exercise control, and to appropriate various breeds or types to his own use, reproduction has been almost entirely along the lines of natural and artificial selection. Thus we may very properly limit the definition of breeding as discussed in this article to the art by which domestic breeds are obtained. Probably the best-known as well as the most ancient maxim of "breeding," and one which has been expressed in one form or another by every ancient writer on husbandry and agriculture of which there is any record, is the familiar aphorism that "like produces like." A natural result of this was the practice of breeding from the best type-specimens. There does not seem at first to have been any consistent system of selection, and as the standard of excellence varied with the passing periods there was no real progress in breed-development, as we understand it to-day. About the middle of the 18th century Robert Bakewell, an Englishman, originated a system of breeding live stock based upon the idea that the principle of "like begetting like" went much farther than the general similarity of the offspring to the parents, and extended to the minutest details of the organization. He made a special study of the form and proportions of animals, and formulated a definite standard of excellence representing the form and internal qualities that he desired to obtain. This standard governed his actions when making selections for breeding purposes. He succeeded so far in molding the plastic forms of the cattle upon which he experimented as to arouse the interest of other breeders, with the result that to-day there are many varieties of improved breeds, all of them of remarkable excellence, but each differing from the others in the characteristics that have been bred into them, to adapt them to special purposes or conditions of environment.

Heredity in Breeding.—There is good reason to believe that not only the external characteristics of the parents are reproduced in the offspring, but that internal structure and functional activity, and in fact every peculiarity of the organization of the parents are also transmitted. Innumerable illustrations from every department of organic life confirm this theory, and if further proof be needed, the hereditary transmission or predisposition to disease will supply it. For instance, it sometimes happens that mares affected with such diseases as ring-bone, navicular disease, etc., in consequence of which they are unfitted for work but are kept as breeders, have colts in which are combined all the good qualities of the parents, but which at the age of five or six years develop diseases similar to those of the disabled parents. Not only are the hereditary characteristics of conformation, temperament, and disease transmitted, but frequently also, the habits and characteristics which have been developed by special conditions of environment, or because of some particular training they have received from man. Illustrations of this may be found in the tendency of well-bred short-horns to mature early and acquire fat rapidly; and the ability of Jerseys and other dairy breeds to secrete a large supply of milk. With the horse, the English thoroughbred racer and the American trotter furnish the most convincing illustrations of what breeders consider the transmission of acquired

characters. It is the various breeds of dogs, however, that form the best examples. It is a common experience of the hunter to discover a setter, pointer, or retriever that has never been "shot over" before, but which "works" with as much skill and steadiness as the most experienced sporting dog. The transmission of *abnormal characteristics of structural conformation* is another fruitful source of the variation of types, as for instance the Dorking fowls, whose characteristic of a fifth toe has been inherited, it is claimed, from a five-toed fowl brought to Britain by the Romans. Similar instances of the working of this law may be found in abundance in every branch of organic life. It does not follow, however, that the immediate offspring of a parent marked by some abnormalism will develop the same characteristic; but that it will make its reappearance in some subsequent generation is an indisputable fact. This phenomenon is technically known as "atavism" (q.v.), but it is more generally described as "throwing-back," "breeding-back," etc. Instances of characteristics that have been extinct for half a century, but which reappear with all the peculiarities of the original breed are in the experience of every breeder. In brief, an offspring may unite in itself the prominent characteristic of one or both parents, or it may resemble a grandparent, or even a remote ancestor; but it is equally the offspring of all its ancestors and, within its own organization in a latent condition are the characteristics of all preceding generations, any one of which may be duplicated in its own offspring. It is at this point that the "law of co-relation" asserts itself, which Miles in his 'Stock Breeding' defines as "any peculiarity in the development of one organ or set of organs, usually accompanied by a corresponding modification or suppression of organs belonging to some other part of the system." With regard to domestic animals, whose flexibility or plasticity of organization is perhaps greater than other animals, we find that the principal causes of animal variation are climate, food, and habit, and that the distinguishing characteristics of the different breeds have been the result of the modifying influences of the environment to which they have been subjected. Thus the small breeds of sheep and cattle in mountainous countries are in decided contrast to those of the same species obtaining their food-supply in the lowlands or fertile valleys. Indeed the relation of the size of animals to their food-supply has been commented upon by writers from the earliest times.

The function of reproduction in the animal organization is also affected by the conditions above mentioned. The procreative ability of many wild species becomes weak or extinct if the animals are subjected to confinement; yet in direct contrast to this we find domesticated varieties more prolific than the wild species—for example, tame ducks deposit more eggs than wild ones; and the same fact is true of dogs, swine, rabbits, pigeons, etc. All authorities are agreed that this greater fecundity is due to the better food-supply and the security generally of domestic conditions. It has been observed that throughout the entire animal kingdom the smaller species of animals are more prolific than the larger ones, and certain it is that they breed at an earlier age, at shorter intervals, and have a greater number of young at each birth.

BREEDING

Breeding from close affinities is known as "in-and-in breeding," the best definition of which is that of Randall, 'Practical Shepherd,' "breeding between relatives, without reference to degree of consanguinity." Possibly no other practice in breeding has been fought over so much as that of "in-and-in" breeding. The opponents of the practice assert that the offspring of closely related parents are born with a predisposition to disease, and that in any event they will suffer from a lack of fecundity. Before going farther into this question, it will be well to state that while high-breeding implies the breeding from animals within the family limits, yet all high-bred animals are not necessarily "in-and-in" bred, although they must be closely bred to a greater or less extent. When a breeder wished to secure a type representing the highest standard of excellence, he has found it necessary to select animals for breeding-stock that possessed the characters he wished to reproduce in the offspring. It followed, therefore, seeing that it is only animals descended from a common ancestor, and having the same hereditary tendencies that possess the desired variations, he was usually compelled to breed together animals that were more or less closely related. No matter how right or how wrong the practice of "in-and-in" breeding may be, it is an indisputable fact that all the successful breeders have practised it more or less in order to retain and fix in their animals the desired tendencies and characters. The most cursory examination of herd-books and breeding-registers will show how closely related all the most valuable animals have been to each other. What may be considered to be the opposite of "in-and-in" breeding, is the practice of pairing together animals belonging to distinct breeds. This is known technically as "cross-breeding." It frequently happens that the offspring of a first-cross between distinct species possess very desirable qualities, but their sterility prevents the formation of a new or intermediate race, so that the cross has to be repeated to secure another such offspring. The mule is the most familiar example of such a cross. Cross-bred cattle while not sterile as is the case with mules, are yet incapable of transmitting their good qualities to their offspring.

The period of gestation in all mammals is determined by causes yet unknown. That it would seem to have some relation to the size of the animal may be gathered from the following examples: Elephant, 20 to 23 months; giraffe, 14 months; dromedary, 12 months; the different varieties of buffalo, from 10 to 12 months; ass, 12 months; mare, 11 months; cow, 285 days; bear, 6 months; reindeer, 8 months; monkey, 7 months; sheep and goat, 5 months; sow, 4 months; beaver, 4 months; lion, 108 days; dog, fox, and wolf, 62 days; cat, 50 days; rabbits, 30 days; squirrel and rat, 28 days; guinea pig, 21 days. The same rule may be traced in the periods of incubation in birds.

To sum up, the art of breeding consists in the exercise of judgment and skill in the matter of selection. The parents must be chosen in accordance with some well-defined purpose and for the conditions under which they will be placed. High-bred males have been found to impress their own good points upon their offspring, more than do high-bred females. In the opinion of many successful breeders, the dan-

gers of "in-and-in" breeding are considerably lessened when a high-bred sire, rather than an inferior animal, is employed. Miles, 'Stock-Breeding,' lays down the rule that "in the improvement of grades as well as pure-bred animals, the selection of breeding-stock must go hand in hand with a judicious system of feeding and management, as the artificial characters which are impressed by the male upon his offspring can only be retained through the influence of essentially the same conditions that originally produced them."

Breeding, Plant. The fundamental principles of plant breeding are simple and may be stated in few words; the practical application of these principles demands the highest and most refined efforts of which the mind of man is capable, and no line of mental effort promises more for the elevation, advancement, prosperity, and happiness of the whole human race. Every plant, animal, and planet occupies its place in the order of nature by the action of two forces—the inherent constitutional life force with all its acquired habits, the sum of which is hereditary; and the numerous complicated external forces or environment. To guide the interaction of these two forces, both of which are only different expressions of the one eternal force, is, and must be, the sole object of the breeder, whether of plants or animals. When we look about us on the plants inhabiting the earth with ourselves and watch any species day by day, we are unable to see any change in some of them. During a lifetime, and in some cases perhaps including the full breadth of human history, no remarkable change seems to have occurred. And yet there is not to-day one plant species which has not undergone great and to a certain extent constant change. The life forces of the plant in endeavoring to harmonize and adapt the action of its acquired tendencies to its surroundings may, through many generations, slowly adapt themselves to the necessities of existence; yet these accrued forces may also produce sudden and, to one not acquainted with its past history, most surprising and unaccountable changes of character. The very existence of the higher orders of plants now inhabiting the earth has been secured to them only by their power of adaptation to crossings, for through the variations produced by the combination of numerous tendencies, individuals are produced which are better endowed to meet the prevailing conditions of life. Thus, to nature's persistence in crossing we owe all that earth now produces in man, animals, or plants; and this magnificently stupendous fact may also be safely carried into the domains of chemistry as well, for what is common air and water but nature's earlier efforts in that line, and our nourishing foods but the result of myriad complex chemical affinities of later date.

Natural and artificial crossing and hybridizing are among the principal remote causes of nearly all otherwise perplexing or unaccountable sports and strange modifications, and also of many of the now well-established species. Variations without immediate antecedent crossing occur always and everywhere from a combination of past crossings, and environments for potential adaptations often exist through generations without becoming actual, and when we fully grasp these facts there is nothing mysterious in the sudden appearance of sports; but

BREEDING

still further intelligent crossings produce more immediate results and of great value, not to the plant in its struggle with natural forces, but to man, by conserving and guiding its life forces to supply him with food, clothing and innumerable other luxuries and necessities. Plant life is so common that one rarely stops to think how utterly dependent we are upon the quiet but magnificently powerful work which plants are constantly performing for us. It was once thought that plants varied within the so-called species but very little, and that true species never varied. We have more lately discovered that no two plants are exactly alike, each one having its own individuality, and that new varieties having endowments of priceless value and even distinct new species can be produced by the plant breeder with the same precision that machinery for locomotion and other useful purposes is produced by the mechanic. The evolution and all the variations of plants are simply the means which they employ in adjusting themselves to external conditions; each plant strives to adapt itself to environment with as little demand upon its forces as possible and still keep up in the race. The best endowed species and individuals win the prize, and by variation as well as persistence. The constantly varying external forces to which all life is everywhere subjected demand that the inherent internal force shall always be ready to adapt itself or perish. The combination and interaction of these innumerable forces embraced in heredity and environment have given us all our bewildering species, none of which ever did or ever will remain constant, for the inherent life force must be pliable or outside forces will sooner or later extinguish it. Thus, adaptability as well as perseverance is one of the prime virtues in plant as in human life. Plant breeding is the intelligent application of the forces of the human mind in guiding the inherent life forces into useful directions by crossing to make perturbations or variations of these forces and by radically changing environments, both of which produce somewhat similar results, thus giving a broader field for selection, which, again, is simply the persistent application of mental force to guide and fix the perturbed forces in the desired channels. Plant breeding is in its earliest infancy. Its possibilities, and even its fundamental principles, are understood but by few. In the past it has been mostly dabbling with tremendous forces which have been only partially appreciated, and has yet to approach the precision which we expect in the handling of steam or electricity; and notwithstanding the occasional sneers of the ignorant, these silent forces embodied in plant life have yet a part to play in the regeneration of the race which, by comparison, will dwarf into insignificance the services which steam and electricity have so far given. Even unconscious or half conscious plant breeding has been one of the greatest forces in the elevation of the race. The chemist and the mechanic have, so to speak, domesticated some of the forces of nature, but the plant breeder is now learning to guide even the creative forces into new and useful channels. This knowledge is a most priceless legacy, making clear the way for some of the greatest benefits which man has ever received from any source by the study of nature. A general knowledge of the relations

and affinities of plants will not be a sufficient equipment for the successful plant breeder. He must be a skilful botanist and biologist, and, having a definite plan, must be able to correctly estimate the action of the two fundamental forces—inherent and external—which he would guide.

The main object of crossing genera, species or varieties is to combine various individual tendencies, thus producing a state of perturbation or partial antagonism by which these tendencies are, in later generations, dissociated and recombined in new proportions, which gives the breeder a wider field for selection. But this opens a much more difficult one,—the selection and fixing of the desired new types from the mass of heterogeneous tendencies produced,—for by crossing, bad traits, as well as good, are always brought forth. The results now secured by the breeder will be in proportion to the accuracy and intensity of selection and the length of time they are applied. By these means the best grains, fruits, nuts, and flowers are capable of still further improvement in ways which to the thoughtless, often seem unnecessary, irrelevant or impossible. When we capture and domesticate the various plants, the life forces are relieved from many of the hardships of an unprotected wild condition, and have more leisure, so to speak, or, in other words, more surplus force to be guided by the hand of man under the new environments into all the useful and beautiful new forms which are constantly appearing under cultivation, crossing and selection. Some plants are very much more pliable than others, as the breeder soon learns. Plants having numerous representatives in various parts of the earth generally possess this adaptability in a much higher degree than the monotypic species, for, having been subjected to great variations of soil, climate and other influences, their continued existence has been secured only by the inherited habits which adaptation demanded; while the monotypic species, not being able to fit themselves for their surroundings without a too radical expensive change, have only continued to exist under certain special conditions. Thus, two important advantages are secured to the breeder who selects from the genera having numerous species—the advantage of naturally acquired pliability, and in the numerous species to work upon by combination for still further variations. The plant breeder, before making combinations, should with great care select the individual plants which seem best adapted to his purpose, as by this course many years of experiment and much needless expense will be avoided. The difference in the individuals which the plant breeder has to work upon are sometimes extremely slight. The ordinary unpractised person cannot, by any possibility, discover the exceedingly minute variations in form, size, color, fragrance, precocity and a thousand other characters which the practised breeder perceives by a lightning-like glance. The work is not easy, requiring an exceedingly keen perception of minute differences, great practice and extreme care in treating the organisms operated upon; and even with all the naturally acquired variations added to those secured by crossing and numerous other means, the careful accumulation of slight individual differences through many generations is imperative, after which sev-

BREED'S HILL—BREGMA

eral generations are often but not always necessary to thoroughly "fix" the desired type for all practical purposes.

The above applies to annuals or those plants generally reproduced by seed. The breeder of plants which can be reproduced by division has great advantage, for any individual variation can be multiplied to any extent desired without the extreme care necessary in fixing by lineal breeding the one which must be reproduced by seed. But even in breeding perennials the first deviations from the original form are often almost unappreciable to the perception, but by accumulating the most minute differences through many generations the deviation from the original form is often astounding. Thus, by careful and intelligent breeding any peculiarity may be made permanent, and valid new species are at times produced by the art of the breeder, and there is no known limit to the improvement of plants by education, breeding, and selection.

The plant breeder is an explorer into the infinite. He will have "no time to make money," and his castle,—the brain,—must be clear and alert in throwing aside fossil ideas and rapidly replacing them with living, throbbing thought, followed by action. Then, and not until then, shall he create marvels of beauty and value in new expressions of materialized force, for everything of value must be produced by the intelligent application of the forces of nature which are always awaiting our commands. The vast possibilities of plant breeding can hardly be estimated. It would not be difficult for one man to breed a new rye, wheat, barley, oats, or rice which would produce one grain more to each head, or a corn which would produce an extra kernel to each ear, another potato to each plant, or an apple, plum, orange, or nut to each tree. What would be the result! In five staples only in the United States alone the inexhaustible forces of nature would produce annually without effort and without cost:

15,000,000	extra bushels of wheat,
5,200,000	extra bushels of corn,
20,000,000	extra bushels of oats,
1,500,000	extra bushels of barley,
21,000,000	extra bushels of potatoes,

But these vast possibilities are not alone for one year, or for our own time or race, but are beneficent legacies for every man, woman, or child who shall ever inhabit the earth. And who can estimate the elevating and refining influences and moral value of flowers with all their graceful forms and bewitching shades and combinations for color and exquisitely varied perfumes? These silent influences are unconsciously felt even by those who do not appreciate them consciously, and thus with better and still better fruits, nuts, grains, and flowers will the earth be transformed and man's thoughts turned from the base destructive forces into the nobler productive ones, which will lift him to higher planes of action toward that happy day when man shall offer his brother man not bullets and bayonets, but richer grains, better fruits, and fairer flowers. Cultivation and care may help plants to do better work temporarily, but by breeding plants may be brought into existence which will do better work always, in all places and for all time. Plants are to be produced which will perform their appointed work better, quicker, and with the utmost precision. Science sees better grains, nuts, fruits,

and vegetables all in new forms, sizes, colors, and flavors, with more nutrients and less waste, and with every injurious and poisonous quality eliminated, and with power to resist sun, wind, rain, frost, and destructive fungus, and insect pests; fruits without stones, seeds or spines; better fibre, coffee, tea, spices, rubber, oil, paper and timber trees, and sugar, starch, color, and perfume plants. Every one of these and ten thousand more are within the reach of the most ordinary skill in plant breeding. Man is slowly learning that he, too, may guide the same forces which have been through all the ages performing this beneficent work which he sees everywhere, above, beneath, and around him in the vast teeming animal and plant life of the world.

LUTHER BURBANK,

American Pomological Society.

Breed's Hill, Mass., a slight elevation in the Charlestown district of Boston, about 700 yards from Bunker Hill. Although the famous engagement of 17 June 1775 is known as the Battle of Bunker Hill, the fighting was done on Breed's Hill. Here was located the American redoubt, against which the British made their three historic charges, and here Warren fell. Bunker Hill monument stands on Breed's Hill.

Breeze, Kidder Randolph, American naval officer: b. Philadelphia, 14 April 1831. He entered the navy in 1846 and served in the Civil War. In 1861 he commanded the third division of Porter's mortar flotilla in the attacks on New Orleans and Vicksburg; in 1863 and 1864 he was lieutenant commander on the Mississippi and took part in the most important engagements; in 1865 he was fleet-captain at the attack on Fort Fisher. He was made captain in 1874.

Breeze-fly. See BOT-FLY.

Brefeld, Oskar, ös'kär brä'fält, German botanist: b. Telgte, Westphalia, 19 Aug. 1839. He was educated at Halle, Munich, and Würzburg. In 1875 he was a lecturer at Berlin; in 1878 he became professor at Eberswald, in 1884 at Münster, and in 1898 at Breslau. His investigations have been chiefly in mycology and he introduced a number of new methods in the study of this science, particularly the use of "gelatine cultures." He has written 'Researches in the Field of Mycology.'

Bregenz, brä-gents' (Latin, *Brigantium*), a town of Austria-Hungary, in Vorarlberg, 77 miles west by north of Innsbruck. It occupies a beautiful site on a slope which rises from the Lake of Constance and terminates on Mount Gebbard, where the ruins of the ancient stronghold of the Counts of Montfort are still seen. It consists of an old town, very poorly built, and a modern, which is more attractive. Among its edifices are three churches and two monasteries, a town hall, and a museum of Roman antiquities, found in the vicinity. Its chief manufacture is framework and other wooden fittings for houses, and it trades in corn, fruit, wine, butter, and cattle. There are saltpetre works, blast furnaces, and coal mines in the vicinity. Pop. about 8,000.

Bregma. In the infant, a little behind the forehead in the middle line of the skull there is a diamond-shaped opening where the bones have not yet closed together. This situation is known as "bregma," and is taken as a landmark in medical and anthropological measurements.

BREHON — BREMEN

Brehon (Irish, *breitheamh*, a judge), an ancient magistrate among the Irish. These magistrates seem to have been hereditary, and before the introduction of Christianity probably combined the offices of judge and priest. They administered justice to their respective tribes — each tribe had one brehon — seated in the open air upon some sods placed on a hill or eminence. The poet Spencer, in his 'View of the State of Ireland,' refers to the Brehon law as an unwritten code handed down by tradition. He was, however, mistaken in regarding it as an unwritten code. Patriarchal as was the administration of the Brehon law, its transmission was not left to tradition. In the earliest manuscripts extant it is said to have been revised by St. Patrick and other learned men, who expunged from it the traces of heathenism, and formed it into a code called the *Senchus Mor*, about 440, and it is implied that a previous written code existed. The Brehon law was exclusively in force in Ireland until 1170. Various ineffectual attempts were made by the English government to suppress it, and it was finally abolished by James I. in 1605. The Brehon laws, like other laws passed at the same period of European history, contained, with some rude principles of justice, many barbarous institutions. The state of society indicated in them seems to be a sort of transition from the communal ownership and periodical repartition of the land, found among several Teutonic nations, to a manorial organization. Several distinct social ranks are indicated, ranging from the nobles to the serfs. They had regular courts, with the right of appeal from lower to higher ones. Most offenses, even including murder, could be commuted by fines, which were fixed with minute precision; but the fines were paid in kind, since coined money was unknown. The laws also carefully provide for and regulate the raising of the children of the upper classes by members of the subordinate classes. The marriage laws were of a very loose character, and the law of inheritance is obscure and complicated. Until recently these laws have been involved in great obscurity. A commission was appointed in 1852 to superintend the publication and translation of the ancient laws of Ireland; and between 1865 and 1885 an edition of the *Senchus Mor* was published in five volumes. See Maine, 'Early History of Institutions' (1875).

Breisach, *brī-zāh*, or **Alt Breisach**, a town of Baden, on an isolated basalt hill (804 feet) on the right side of the Rhine, 14 miles west of Freiburg. The Mons Brisiacus of Cæsar, it was taken by Ariovistus when he invaded Gaul; being regarded as the key to western Germany, it figured prominently in the wars of the 17th and 18th centuries. The minster is a 13th century structure. It carries on an active trade in lumber and cattle, and manufactures beer, wall paper, wine, etc.

Breitbach, *brīt'bāh*, **Karl**, German painter: b. Berlin, 14 May 1833. He was educated at the Berlin Academy and in Paris under Couture. He first devoted himself to landscape painting, but later became both a genre and a portrait painter. Among his works are: 'Mill of St. Ouen near Paris'; 'The Trianon Park'; 'Sunrise in the Bavarian Highlands'; 'Kirmess — Joy'; 'Kirmess — Sorrow'; 'Village Children

Bathing'; 'At the Fortune Teller's'; and portraits of Weber and others. He has also painted interior decorations.

Breitenfeld, *brī'tēn-fēlt*, a village of Saxony, four miles north of Leipsic. Here two battles were gained by the Swedes during the Thirty Years' War. In the first, fought on 7 Sept. 1631, Gustavus Adolphus, joined by the Saxons, defeated Tilly and Pappenheim; in the second, on 2 Nov. 1642, Torstenson, who had succeeded on the death of Baner to the command of the Swedish army in Germany, again defeated the Imperialists under the Archduke Leopold and Piccolomini, who had advanced to the relief of Leipsic, invested by the Swedes. Leipsic surrendered after the battle. Breitenfeld was also the scene of a portion of the battle of Leipsic, won by the allies against Napoleon, 16-19 Oct. 1813.

Breitkopf, **Johann Gottlob Immanuel**, *yō'hān gōt'lōb im-mān'oo-ēl brīt'kōpf*, German printer and publisher: b. Leipsic, 1719; d. 1794. He was educated in the university of his native city, and following out a scientific study of printing, he evolved improvements in musical notation and in German text. To him is probably due the present form of modern printed music. In 1764 he established in Leipsic the publishing house known as Breitkopf and Härtel from 1795. He was the author of 'Ueber die Geschichte der Erfindung der Buchdrucker-kunst' (1779); 'Ueber den Druck der Geographischen Karten' (1777-9).

Breitman, **Hans**, *hānts brīt'mān*. See **LAND**, **CHARLES GODFREY**.

Brekelenkam, *brā-kē-lēn'kām*, **Quirin**, Dutch painter: b. Zwammerdam, near Leyden, about 1620; d. Leyden, 1668. He was to some extent an imitator of Dou, and perhaps his pupil. His subjects are from the life of the people, and his treatment marked by fidelity to nature and breadth of style. Among his most characteristic paintings are: 'The Fireside'; 'Monk Writing'; 'Interior'; 'The Sandwich'; 'Game of Cards'; and 'A Brazier.'

Bremen, *brā'mēn*, Germany, a port and free city, and an independent member of the empire, one of the three Hanse towns, is situated on the Weser, about 50 miles from its mouth, in its own small territory of 98 square miles, besides which it possesses the town and port of Bremerhaven at the mouth of the river. The town is divided into the old town (Altstadt), on the right bank of the river; the new town (Neustadt), on the left bank of the river, and the extensive suburbs (Vorstädte). The first is separated from the suburban quarters adjoining by the ramparts of the city, now converted into walks and pleasure-grounds, and forms a sort of semicircle on the right bank of the river. The new town lies on the left bank of the river opposite the old, with which it is connected by three bridges, two of them crossing the main stream, and the third crossing an arm of it called the Little Weser, besides a railway bridge. Extensive suburbs lie on this side also. The streets of the old town are generally narrow and crooked, and lined with antique houses in the style of the Middle Ages. This is the business quarter of the city, and contains the chief public buildings, including the cathedral, the old Gothic council-house, with the famous wine

BREMER — BREND'AMOUR

cellar below it, the modern town-hall, the Schütting or merchants'-house, the old and the new exchange, etc. The new town has straight, well-built streets, lined mostly with dwelling-houses and shops. The suburbs also consist chiefly of dwelling-houses, and as these often have gardens in front, the streets have a very pleasant aspect. The chief ecclesiastical building is the cathedral, a Romanesque edifice, founded in 1044, subsequently added to at various times, and in 1888-93 provided with two new western towers. There are several other old and interesting churches, as those of St. Ansgar, St. Stephen, and St. John. Among buildings of recent erection are the court-house, savings bank, and railway station. There are several squares and open spaces, and besides the pleasure-grounds formed from the ramparts, a large public park has been laid out on the north side of the town. Bremen is well supplied with schools and other educational institutions, and possesses a museum, a library (120,000 volumes), an observatory, etc. The manufacturing establishments include tobacco and cigar factories, sugar-refineries, rice-mills, iron-foundries, and machine works, rope and sail works, and ship-building yards. It is from its commerce, however, that Bremen derives its importance. Its situation renders it the emporium of Hanover, Brunswick, Hesse, and other countries traversed by the Weser, and next to Hamburg it is the principal seat of the export and import trade of Germany. The Weser has been deepened so that sea-going ships drawing 17 feet of water can now ascend to the Bremen docks, but the great bulk of the shipping trade centres in Bremerhaven and Geestemünde. Bremerhaven is now a place of over 18,000 inhabitants, and is provided with excellent docks capable of receiving the largest vessels; it is connected by railway with Bremen, where the chief trading companies, merchants, and brokers have their offices. The greater portion of the German trade with the United States passes through Bremen, and it is the chief port of emigration on the Continent. The chief imports are tobacco, raw cotton, and cotton manufactures, wool and woollen manufactures, rice, coffee, grain, petroleum, etc., which are of course chiefly re-exported to other parts of Germany and the Continent. Next to Liverpool, Bremen is to-day the leading European cotton market. Before the organization of the cotton exchange in 1872, the German merchants had been getting their product chiefly from Havre and Liverpool, very little being imported direct. To become independent of British ports, it was necessary to get the patronage of the inland spinners. This proved no easy task. Not until a decade had passed did the Bremen exchange cease to be a local institution and acquire a standing of national importance; but ever since the development has been phenomenal. While the importation of cotton in the year 1870 amounted to only 157,689 bales, it ran up to 397,998 bales in the year 1880. Ten years later there were 812,538 bales and the year 1900 showed the enormous figure of 1,567,045 bales. The new cotton exchange opened in 1902 is said to be not only the most imposing structure of this nature in the world, but also the most complete in the appointments necessary for carrying on the business of buying and selling cotton and supplying the leading merchants and brokers with office and sample rooms.

Bremen first rose into note about 788, when it was made the seat of a bishopric by Charlemagne. It was afterward raised to the dignity of an archbishopric, and by the end of the 14th century it had become virtually a free imperial city. At the Treaty of Westphalia in 1648 the archbishopric was secularized, and became a duchy under the supremacy of Sweden. In 1731, when the elector of Brunswick gained possession of the duchy, the privileges of Bremen as a free city were confirmed. From 1810 to 1813 it formed part of the French empire. The constitution is in most respects republican. The legislative authority is shared by the senate, a body of 18 (12 of whom must be lawyers, and 5 merchants) elected for life, and presided over by two of their own number alternately, who have the title of burgomaster; and by an assembly of 150 citizens elected for six years. The executive power is intrusted to the senate and senatorial committees. Pop. of the total territory (including Bremerhaven) about 228,000.

Bremer, brä'mér, Fredrika, Swedish novelist: b. Tuorla, Finland, 17 Aug. 1801; d. Arsta, 31 Dec. 1865. At 17 she was taken on a tour through Germany, Switzerland, and France. In 1828 appeared the first volume of her 'Sketches of Everyday Life,' but the second volume, 'The H. Family' (1833; English translation, 1844), first revealed her power. From this time she devoted herself to writing stories that quickly became popular in translations far beyond the bounds of Sweden, and she varied her literary labor by long journeys in Italy, England, the United States, Greece, Palestine, which supplied the materials for her 'Homes of the New World' (1853), and 'Life in the Old World' (1862), full of fine descriptions of scenery and vivid pictures of social life, with sound views on political and moral questions. The admirable translations of Mary Howitt had preceded her in the United States as well as England, and insured her an equally warm welcome on both sides of the Atlantic. On her return to Sweden she gave herself up to philanthropy, but more particularly to the education and emancipation of women, and the consequent propagandist character of her later novels, 'Bertha,' and 'Father and Daughter' (1859), was detrimental in no small degree to their literary value. Her religious views she set forth in her 'Morning Watches' (1842). She has been called the Jane Austen of Sweden. Of her stories perhaps the most perfect is 'The Neighbors' (1837). 'The Diary,' 'The President's Daughters,' 'Brothers and Sisters,' and 'Strife and Peace, or Scenes in Dalecarlia,' are only less popular.

Bremerhaven, brä'mér-hä-fén, the port of Bremen, Germany, on the east shore of the Weser estuary, nearly 10 miles from the open sea, and 39 north-northwest of Bremen. It was founded by Bremen, in 1827, on ground acquired from Hanover, and rapidly became a thriving place. A second dock was opened in 1866, a third in 1874, and in 1888 a great port, with docks, was undertaken at Nordenham, on the opposite bank. Bremerhaven was the scene, in 1875, of a dynamite explosion on board a mail steamship, by which 60 persons were killed. The Geeste separated Bremerhaven from Geestemünde.

Brend'amour, brän-dä-moor, Franz Robert, German engraver: b. Aix-la-Chapelle, 16 Oct.

BRENDAN — BRENNUS

1831. He was educated in his art at Cologne under Stephan. In 1856 he went to Düsseldorf and established a xylographic studio, which rapidly became well known and one of the leading institutions of its kind. He later set up similar studios in Berlin, Leipsic, Brunswick, Stuttgart, and Munich, to conducting which he devoted most of his time. Among his best works are a collection, 112 engravings, after drawings by Rudolf Elster; illustrations for several works, including Immermann's 'Der Oberhof,' and Count Waldersee's 'Der Jäger'; 'The Odyssey,' after drawings by Preller, and eight frescoes in the Rathhaus at Aix-la-Chapelle.

Bren'dan, or Brenaínn, Saint, of Clonfert: b. 484 at what is now Tralee in Kerry; d. 577. He was educated under his relative, Bishop Erc, and St. Jarlath of Tuam, and was ordained by the former. Shortly afterward he went on a seven years' voyage in search of 'the mysterious land far from human ken'; but without success. Later he visited and lived in Brittany for a time, and after his return he again set out to seek the distant paradise, which he ultimately found. When he again reached Ireland he founded the monastery of Cluain Fearta (Clonfert), and he seems to have visited Scotland at this time. His two voyages form the basis of the celebrated mediæval legend of the 'Navigation of St. Brendan'; but in the legend they are united into one and combined with other stories. Where Brendan's voyages really led him we do not know. The Book of Lismore contains a life of St. Brendan.

Another Irish saint of the same name was born about 490 and died in 573. He was a friend of Columba, and founded a monastery at Birr (Parsonstown) in King's County.

Brendel, Heinrich Albert, hīn'rin āl'bért brēn'dēl, German painter: b. Berlin, 7 June 1827; d. 1895. He studied at the Berlin Art Academy under Krause, and in Paris as a pupil of Couture and Palizzi. After traveling in Italy and Sicily, he lived in Paris, 1854-64; he then returned to Germany and lived in Berlin and Weimar, becoming director of the Art School at the latter place. He devoted himself almost entirely to animal painting, and his pictures of sheep are considered especially fine. His works include: 'Peasant's Farm,' 'Interior of Sheep Stable,' 'Sheep Leaving Stable.'

Bren'eman, Abram Adam, American chemist: b. Lancaster, Pa., 28 April 1847. He graduated at Pennsylvania State College in 1866, and after service as an instructor, was full professor of chemistry 1869-72. From 1873 to 1882 he was assistant, lecturer, and professor of industrial chemistry at Cornell. Since then he has resided in New York, engaged in professional work as a writer, analyst, and chemical expert. He is the inventor of the Breneman process of rendering iron non-corrosive, and has made a special study of water and its contaminations. He has written: 'Manual of Introductory Laboratory Practice' (1875); 'Report on the Fixation of Atmospheric Nitrogen' (1890); and numerous contributions to chemical and other journals.

Brenham, brēn'ām, Texas, a city and county-seat of Washington County, on the Gulf, C. & S. F. and the Houston & T. C. R.R.'s, west of Houston. It is the centre of an agricultural

and cotton region, and has two cotton compresses, a cotton factory, and a cottonseed-oil mill, as well as other manufacturing interests. It is the seat of the Blim Memorial and Evangelical Lutheran colleges, has a library, two parks, and fair grounds. Pop. (1910) 4,718.

Bren'nan, Thomas Francis, Irish Catholic prelate: b. Tipperary, 1853. He was educated at Allegheny College, Pa., at Rouen, and Innsbruck. He was engaged in missionary work in Pennsylvania and was later made bishop of Dallas, Texas. In 1893 he went to Labrador, and in 1894-5 was auxiliary bishop of Newfoundland; since then he has been acting auxiliary bishop of Albano and Frascati, Italy.

Bren'ner, Mount, a mountain in the Tyrol, situated between Innsbruck and Sterzing, and between the rivers Inn, Aicha, and Adige, forming part of the Tyrolean Alps, 6,777 feet high. The road from Germany to Italy traverses this mountain. It reaches the elevation of 4,658 feet, and is about 12 miles long. This is one of the lowest roads practicable for carriages over the main chain of the Alps, and also one of the most ancient, having been used by the Romans. In 1867 a railway over the Brenner Pass was opened, so that Italy and Germany were connected by an unbroken line of rails.

Bren'nus, the name or title of several princes of the ancient Gauls, supposed to be derived from the Kymrian *brenhin*, a king. A leader of the Senones, a Gallic nation in the upper part of Italy, the most famous personage who is mentioned under this name, made an invasion into the Roman territory about the year 390 B.C. A battle was fought near the river Allia, the Romans were totally defeated, and Brennus took possession of the city, which had been previously abandoned by the inhabitants. The capitol only was provided with a garrison, but several aged citizens of rank, amounting in the whole to about 80, had resolved to remain in the city and devote themselves to the infernal deities. Attired in their sacerdotal, consular, and triumphal robes, they seated themselves in their chairs of office in the middle of the forum, awaiting death. When Brennus arrived at the forum, he was struck with astonishment at their venerable aspect. The Gauls looked upon them as so many statues of deities, and feared to go near them, but ultimately they were all massacred. Rome was sacked, and all the inhabitants who yet remained in their houses were slain. Brennus then assaulted the capitol, and being repelled with considerable loss, he set fire to the city and leveled it with the ground. While the garrison of the capitol was in great distress Brennus attempted a surprise by night, in which he would have succeeded had not the cackling of the geese, sacred to Juno, alarmed the garrison, in consequence of which the Gauls were repulsed. After six months Brennus offered to raise the siege and leave the Roman territory for 1,000 pounds of gold. When the gold was weighed, Brennus threw his sword into the scale beside the weights and cried out, "Woe to the vanquished!" According to Polybius the Gauls returned home in safety with their booty. According to the Roman legend followed by Livy, Brennus was defeated, and his army entirely destroyed by Camillus, a distinguished

BRENT — BRENTON

Roman exile who had retired to the city of Ardea, and who arrived with succor in time to save the capitol.

Another Brennus in 279 B.C. advanced into Greece with an enormous force, said to have amounted to 150,000 foot and 61,000 horse. After ravaging Macedonia he entered Thessaly and marched toward Thermopylae, where an army of 20,000 Greeks was assembled, supported by an Athenian fleet on the coast. The Gauls were repulsed in a sanguinary battle, but, in order to separate the Greeks, they dispersed themselves to plunder the country. Brennus himself attacked the temple of Delphi, which was defended by only 4,000 men, but was again repulsed, and carried out of the battle fainting with his wounds. Unwilling to survive his defeat, he put an end to his life by copious draughts of wine. The Greeks attributed their victory to the assistance of Apollo.

Brent, Charles Henry, American clergyman: b. Newcastle, Ontario, Canada, 1862. He was graduated at the University of Trinity College in 1884, ordained deacon in the Protestant Episcopal Church in 1886, priest in 1887, and consecrated the first bishop of the Protestant Episcopal Church for the Philippine Islands in December 1901. He served in the ministry of St. Paul's Pro-Cathedral, Buffalo, 1887-8; removed to Boston in the latter year, where he had charge of the parish of St. John the Evangelist, and later of that of St. Stephen's Church, devoting himself entirely to the missionary work of the latter parish. He has performed considerable literary work; was on the editorial staff of the *New York Churchman* for some time, and is the author of 'With God in the World,' and other books.

Brent Goose. See BRANT.

Bren'ta (ancient MEDOACUS MAJOR), a river in north Italy. Its source is Lake Caldonazzo in the Tyrol, eight miles southeast of Trent, whence it flows southeast, with a winding course of 112 miles, and falls into the Adriatic through the canal of Brenta-nova or Brentono, at Brondolo. Formerly its embouchure was at Fusina, opposite Venice. The old course has been formed into a canal, and is the chief means of communication between Padua and Venice, the new channel being comparatively little used.

Brentano, brén-tā'nō, Clemens, German poet: b. Frankfort-on-the-Main, 8 Sept. 1778; d. Aschaffenburg, 28 July 1842. He studied at Jena, and resided by turns there and at Frankfort, Heidelberg, Vienna, and Berlin. In 1818 he retired to the convent of Dülmen, in Münster, and the latter years of his life were spent at Ratisbon, Munich, and Frankfort-on-the-Main. These frequent changes were due to a restless disposition, combined with morbid and misanthropic views, which gave a peculiar character to his writings. With a powerful imagination, his genius was tinged with mysticism, eccentricity, and a strong tendency to sarcasm. He was the brother of Elizabeth von Arnim, Goethe's "Bettina." Among his principal works are 'Satires and Poetical Fancies' (1800); 'The Mother's Statue' (1801), an ultra-romantic production, which he himself calls a very wild romance; 'The Joyous Musicians' (1803); 'Ponce de Leon' (1804); 'The Founding of Prague' (1816), said to be his most successful drama; 'Gokel, Hinkel, and Gakeleia' (1838),

a satire on the times; 'History of the Brave Caspar and the Beautiful Annerl' (2d ed. 1851), which is considered a masterpiece as a novelette.

Brentano, Franz, German philosopher: b. Marienberg, 16 Jan. 1838. He was professor of philosophy at Würzburg, but in 1873 resigned his position on account of the doctrine of the infallibility of the Pope; and was professor at Vienna, 1874-80. He has written 'Psychology of Aristotle,' 'New Riddles,' and 'Psychology from an Empirical Standpoint' (in agreement with Lotze and the English empirical psychologists).

Brentano, Lorenz, German American politician: b. Mannheim, 4 Nov. 1813; d. Chicago, 18 Sept. 1891. He studied law at Heidelberg, represented Mannheim in the Lower House of Baden, and was a member of the National Assembly in 1848. He withdrew from this body with the majority of the radical party in 1849. He was placed at the head of the revolutionary government of Baden, but suspected of treachery to his party, was forced to flee to Switzerland. In 1850 he came to the United States, lived for a time on a farm in Michigan, and then went to Chicago. Here he practised law and established the Illinois *Staatszeitung*, which he made one of the most influential papers in the northwest in the interest of the Federal government. He was a member of the Illinois legislature in 1862; United States consul at Dresden 1872-6, and member of Congress from Illinois in 1876.

Brentano, Lujo, loo'yō, German political economist: b. Aschaffenburg, Bavaria, 18 Dec. 1844. He studied at Dublin and at four German universities; and, after attaining a post in the Royal Statistical Seminary in Berlin, went to England to study the condition of the working classes, and especially trades' associations and unions. The outcome of this was his work, 'On the History and Development of English Guilds' (1870); 'Die Arbeitergilden der Gegenwart' (1871-2). He has been professor at Breslau (1873), Strasburg, Vienna, Leipsic, Munich (1891). He supports the "Socialists of the Chair" (*Kathedersozialisten*) against the German free-trade school, and has written works on 'Wages' (1877); 'Labor in Relation to Land' (1877), and 'Compulsory Insurance for Workmen' (1881), on the English Chartists, on the Christian Socialist movement in England, and numerous polemical pamphlets.

Brent'ford, the county town of Middlesex, England, seven miles west of London. It has a weekly market and two annual fairs. Here Edmund Ironside defeated the Danes, under Canute, in 1016; and Prince Rupert a part of the parliamentary forces, under Col. Hollis, in 1642. Sion House, the magnificent edifice of the Duke of Somerset, where Lady Jane Grey resided, now belonging to the Duke of Northumberland, was built here on the site of a suppressed nunnery. Brentford has a considerable retail trade, a soap manufactory, and extensive sawing and planing mills. Pop. (1891) 13,738; (1901) 15,171; (1910) estimated 14,125.

Brenton, William, colonial governor: b. England, early in the 17th century; d. Newport, R. I., 1674. His family came to Rhode Island from Hammersmith, England, where they were of good social standing. Between 1635 and 1669 Brenton was the colony's representative at

BRENZ — BRESLAU

Boston, lieutenant-governor, president of the colony, and governor under the Charles II. charter 1666-9. He was one of the nine original proprietaries of Rhode Island; he selected and surveyed the site of Newport, and built a large brick residence where Fort Adams now stands. Brenton's Point and Brenton's Reef in Narragansett Bay preserve his name. See 'Rhode Island Colonial Records,' Vols. I. and II., *passim*.

Brenz, Johann, yō'hān brēnts, German reformer: b. 1499; d. 1570. He was one of the authors of the *Syngramma Suevicum*, bearing upon the controversy with Zwingli and Oecolampadius, on the subject of the Lord's Supper. He was the most resolute among the opponents of the interdict of Charles V., escaping death only by resorting to flight.

Brereton, Austin, English journalist: b. Liverpool, England, 13 July 1862. He went to London in 1881, has been dramatic critic of 'The Sphere' from 1901, and prior to that date was connected with 'The Stage'; 'The Theatre'; Sydney (N. S. W.) *Morning Herald*; and the 'Illustrated American,' New York. He has published Henry Irving's 'A Biographical Sketch' (1883); 'Some Famous Hamlets' (1884); 'Dramatic Notes' (1886); 'Shakespearean Scenes and Characters' (1886); 'Romeo and Juliet on the Stage' (1890); 'Sarah Bernhardt' (1891); 'Gallery of Players' (1894); 'Short History of the Strand Theatre' (1899); 'Cheltenham' (1899); 'By the Silent Highway' (1901); 'Peg Woffington, On and Off the Stage' (1901); 'The Well of St. Anne' (1901); 'A Ramble in Bath' (1901).

Brescia, brē'sha (Latin, *Brixia*), an episcopal city of Lombardy, Italy. It is situated at the foot of the Alps, 40 miles northwest of Verona, on a fertile and beautiful plain on the banks of the rivers Mella and Garza. It is the capital of the province of the same name, and is a handsome and flourishing city, of a square form, about four miles in circuit, and surrounded by walls. Its streets are spacious, and its public buildings numerous, particularly its churches, which are further remarkable for the number and value of the paintings with which they are enriched. A few of them only, however, have much pretension to architectural beauty; among those that have are the cathedral, a handsome structure of white marble, and the Church of San Domenico. But, however plain in exterior appearance most of the Brescian churches may be, they are all richly decorated within with the most beautiful frescoes, and other creations of taste and art. The other buildings most worthy of notice are the Palazzo della Loggia, and the Broletto. The first was intended for the palace of the municipality, or city hall. It is composed of the richest marbles, and was worked upon by the first architects of the 15th and 16th centuries successively. The Broletto, the ancient palace of the republic, combines the characters of fortress and city hall, and is surmounted by a great tower, whose deeply cleft Italian battlements produce a singularly grand effect. The whole is in a colossal style, and marked by the peculiar characteristics of the age in which it rose—supposed to be about the end of the 12th, and beginning of the 13th century. The city contains also a lyceum, two gymnasia, an athe-næum, a college, with a museum of antiquities,

and a botanic garden; a public library, with 30,000 volumes; a theological seminary, a handsome theatre, a corn exchange, an extensive hospital, and other educational and charitable establishments. There are 72 public fountains in the streets and squares, besides some hundreds of private ones. Outside the town is a cemetery, begun in 1815, designed by Vantini.

Brescia is a place of considerable trade and manufacturing industry. Near it are large iron-works, and its firearms are esteemed the best that are made in Italy. It has also silk, linen, and paper factories, tan-yards, and oil-mills, and is an important mart for raw silk. But it derives its greatest interest from its fine Roman remains, having been at one time the seat of a Roman colony. These first attracted attention in the 17th century; although, so far as regards inscriptions, they had been objects of especial care to the citizens of Brescia for two centuries before this period, but it was not till 1820 that any very earnest efforts were made to bring the buried remains of entire buildings to light. Since that period some remarkable discoveries have been made, embracing besides numerous statues and inscriptions the beautiful marble temple of Vespasian, and a number of noble and magnificent Corinthian columns, with many fragments of moldings and ornaments, some gilt, and all of great elegance. Brescia was the seat of a school of painting of great merit, to which many eminent artists belonged, including Alessandro Bonvicino, commonly called 'Il Moretto,' who flourished in the 16th century, and was remarkable for the deep devotional feeling which he threw into his sacred subjects, as well as for his excellence as a portrait painter. The city is of great antiquity, having been the chief town of the Cenomani, a Gallic tribe, who were conquered by the Romans. It became the seat of a Roman colony under Augustus about 15 B.C., and afterward a municipium. In the year 412 it was burned by the Goths; and was soon afterward destroyed by Attila; but was rebuilt about the year 452. It was taken by Charlemagne in 774. In 936 Otho I. of Saxony declared it a free city, and it so remained for nearly three centuries, taking an active part in the feuds of the Guelphs and Ghibellines, and ultimately put itself under the protection of Venice in 1426. In 1796 it was taken by the French, and was assigned to Austria by the general treaty signed at Vienna 9 June 1815. In 1849 it was involved in the commotions of continental Europe; its streets were barricaded, but the city was eventually captured by the Austrians under Gen. Haynau. It was ceded to Sardinia by the Treaty of Zürich in 1859. Pop. (1896) 67,500; (1901) 70,618; (1910) estimated 96,225.

Breslau, brēs'low, a city of Germany, the second in size in the Prussian dominions, being exceeded in population only by the capital, Berlin; the capital of the province of Silesia. It is situated in a spacious plain at the confluence of the Ohlau and the Oder, the latter dividing in into two main portions (the largest on the left bank), which, with islands in the river, are connected by a large number of bridges. The streets of the older quarters are narrow, those of the newer broad. There are electric and other tramways. The public squares and buildings are handsome. The fortifications which surrounded the old or inner city have been con-

BRESSANI — BRETEUIL

verted into promenades, and the ditch into an ornamental sheet of water. The cathedral, built in 1148-1680, and restored in 1875, the Protestant churches of St. Elizabeth and St. Mary Magdalene, the Rathhaus or city-hall, a Gothic structure of the 14th and 15th centuries, the municipal buildings, the government buildings, the building for the provincial diet, the royal residence, court-houses, exchange, and university buildings are among the most remarkable buildings. The university was founded in 1702 as a Roman Catholic institution, with which was combined the Protestant university at Frankfurt-on-the-Oder, transferred hither in 1811. The university has attached to it a museum of natural history, a cabinet of antiquities, a library of 320,000 volumes, including many old works and manuscripts, an observatory, a picture gallery, a botanic garden, etc. The number of students is about 1,500. There are numerous other educational institutions, as well as hospitals and asylums. Breslau carries on an extensive trade in the products and manufactures of Silesia, principally in corn, wool, metals, glass, coal, and timber. The Oder is navigable and there is a connection with Berlin by the Oder-Spree Canal. The industries comprise iron-founding, bell-founding, the manufacture of machinery, railway carriages, organs, and other musical instruments, cigars, oil, spirits, etc., brewing, and glass-painting. There are two annual wool-fairs, which are largely attended. Breslau was the seat of a bishopric by the year 1000; an independent duchy from 1163 to 1335; was ceded to Austria, after many wars and calamities, in 1527. It was conquered by Frederick II. of Prussia in 1741. It was from this time the scene of frequent warfare, being successively attacked by Austrians, French, Russians, and Prussians. It was twice occupied by the French, in 1807 and 1813. Its fortifications were destroyed by Napoleon in 1807, but it finally remained in the hands of Prussia. The population is about 450,000.

Bressani, Francesco Giuseppe, frân-chês'kô joo-sêp'pê brês-sâ'ne, Italian missionary: b. Rome 1612; d. Florence 9 Sept. 1672. He labored during nine years among the Huron Indians of Canada, was captured and ill treated by the Iroquois, and afterward sold to the Dutch and kept in bondage until 1644, when he was ransomed. On his return to Italy, he published a book on the Jesuit missionaries in Canada.

Bressay, brês'sâ, one of the Shetland Islands, lying east of the mainland, and separated from it by Bressay Sound, about six miles long and one to three in breadth. Its line of coast is rocky and deeply indented; the interior is hilly, rising in the Wart of Bressay to 742 feet, and is to a great extent covered with peat-moss. There are a number of small streams and small lakes. On the south there are three bold headlands, the Ord, the Bard, and the Hammar. The inhabitants are mostly crofters, sailors in the merchant service, or fishermen. Hosiery is the only manufacture. Bressay Sound forms a safe harbor (Lerwick Harbor), one mile or more in breadth, having Lerwick on its west side. Pop. (estimated) 2,000.

Brest, a fortified seaport and naval station of France, in the department of Finistère, in the former province of Brittany, situated at the

mouth of the Penfeld, 320 miles south by west from Paris. It has one of the best harbors in France, and a safe roadstead, capable of containing 500 men-of-war in 8, 10, and 15 fathoms at low water, and it is the chief station of the French marine. The coast on both sides is well fortified. The entrance to the roads, known as Le Goulet, is narrow and difficult, with covered rocks that make it dangerous to those not well acquainted with it. There are immense magazines, workshops, barracks, roperies, etc., and the dockyard employs from 8,000 to 9,000 men. Several docks are cut in the solid rock. Brest, which in the Middle Ages was of so much importance that it was said, "He is not Duke of Brittany who is not lord of Brest," had sunk by the beginning of the reign of Louis XIII. to little more than a village. Richelieu resolved to make it the seat of a vast naval arsenal, but little was done till the beginning of the reign of Louis XIV., when Duquesne came to superintend the works. Vauban followed him, and fortified it. In 1694 the combined fleets of England and Holland disembarked a force which attempted to take Brest, but was repulsed with great loss. On 1 June 1794 the French fleet was beaten off Brest by the British, under Howe, who took from them six ships of the line, and sunk a seventh. The manufacturing industry of Brest is inconsiderable, but its commerce is extensive. Its chief exports are cereals; its principal imports colonial produce and naval stores.

Brest-Litovski, brêst-le-tôfs'kê, a fortified town of Russia, in the government of Grodno, on the Bug, 120 miles east of Warsaw. Brest-Litovski was a possession of Poland till 1795, and is one of the oldest Slav towns. The place is an important railroad centre and of considerable commercial importance because of its situation, and has a large trade in cloths, leather, and soap. It is a fortress of the first rank, with vast magazines and military stores. Pop. about 50,000.

Bretagne. See BRITANY.

Bretèche, a name common to several wooden, crenellated, and roofed erections, used in the Middle Ages in sieges by the assailants to afford protection while they were undermining the walls, and by the besieged to form defenses behind breaches. Later, the name was given to a sort of roofed wooden balcony or cage, crenellated and machicolated, attached by corbels, sometimes immediately over a gateway.

Breteuil, Louis Charles Auguste le Tonnelier, loo-ê ô-goost lê tôn-nêl-yâ brê-tê-y' (BARON DE), French diplomatist: b. 1730; d. 2 Nov. 1807. After a period of military service he became in 1758 minister plenipotentiary at Copenhagen, and afterward occupied similar posts in Sweden, Austria, Naples, and again in Vienna. His embassy to Vienna explains his attachment to the Queen Marie Antoinette. As minister and secretary of state after Necker's dismissal in 1789, he was a zealous defender of the monarchy; he was therefore considered as one of the greatest enemies of the Revolution. After the capture of the Bastille, he escaped by a hasty flight. In 1790 Louis XVI. entrusted him with secret negotiations for his restoration to the throne, at the principal northern courts. The convention issued a decree against

BRETHREN—BRETON

him. In 1802 he returned, with the permission of the government, to France.

Brethren, Bohemian, a Christian sect of Bohemia, formed from the remains of the stricter sort of Hussites in the latter half of the 15th century. They took the Scriptures as the ground of their doctrines throughout. Being persecuted, they fled into Poland and Prussia. See **BOHEMIAN BRETHREN**; **MORAVIAN CHURCH**; **UNITED BRETHREN**.

Brethren of the Christian Schools, an order established at Rheims by the Saint Jean Baptiste de La Salle (q.v.). The object of the order was to provide instruction for the poorer classes of the population, and hence the name. The members take upon themselves the vows of chastity, poverty, and obedience. Their costume is a coarse black cassock, and a small collar or band around the neck, for the house, and a hooded cloak and a wide hat for outdoor purposes. Their teaching is mainly rudimentary, although in some of their schools Latin and the higher mathematics form part of the course. They have modified their instruction from time to time to make it meet the wants of the classes whom they teach. Thus, in 1831 they opened evening schools for adults, wherein they received and taught mechanics and other poor laborers who had no time to devote to learning in the day. The Brethren of the Christian Schools are sometimes improperly called the "Christian Brothers." The latter have nearly the same rule and object, but form an independent order. See **BROTHERS OF THE CHRISTIAN SCHOOLS**; **ORDERS, RELIGIOUS**.

Brethren of the Free Spirit, a sect which sprang up on the upper Rhine near the beginning of the 13th century. They are frequently confounded with the Lollards, Beguards, or Beguins. They held that the universe was a divine emanation; that man, so far as he gave himself to the contemplative life, was a Christ, and as such, free from law, human or divine (Romans viii. 2, 14). Many edicts were published against this sect, but it continued to exist under various names, such as Picards and Adamites, till about the first quarter of the 15th century.

Brethren of the Holy Trinity, a religious society, founded in France near the close of the 12th century, whose members pledged themselves to give a third part of their revenues to procuring the redemption of Christians who had fallen captive to the infidels, and were in Mohammedan slavery. It was established by John of Matha, a Parisian theologian, and Felix de Valois.

Brethren of the Lord, The. Great controversy has existed concerning the expressions in the New Testament relating to the "brethren of Jesus," and theologians have been divided on the question of the perpetual virginity of Mary the mother of Jesus. The term "brethren of the Lord" occurs but once in the New Testament (1 Cor. ix. 5), but there are several other passages that refer apparently to actual brothers of Jesus (Gal. i. 19; Matt. xii. 46-50, etc.). Some have claimed that the brethren referred to were later sons of Mary by Joseph, the reputed father of Jesus; others have contended that they were sons of Joseph by a former marriage, and others again have sought to prove that these brethren were sons of Alphæus, the

husband of a sister of Mary, and therefore the cousins of Jesus.

Brethren of the Strict Observance, the stricter Franciscans, or Regular Observatines.

Bretigny, brê-tên-yê, a village of France in the department of Eure-et-Loire, six miles southeast of Châtres, on the Paris & O. R.R. By the treaty of Bretigny, concluded on 8 May 1360, between Edward III. of England and John II. of France, the latter, who had been taken prisoner at the battle of Poitiers, recovered his liberty on a ransom of 3,000,000 crowns, to be paid in six years. Edward renounced his claim to the crown of France, and relinquished a portion of his conquests and possessions in that country, including Anjou and Maine, and the greater part of Normandy; receiving the cession in independent sovereignty of the duchy of Aquitaine, with all its dependencies; Gascony, Poitou, Saintonge, Aunis, Agenois, Périgord, Limousin, Quercy, Rouergue, Angoumois, together with Calais, the counties of Ponthieu and Guines, and the viscounty of Montreuil.

Breton, Jean Baptiste Joseph, zhôn báp-têst zhô-zêf brê-tôn, French journalist: b. Paris 16 Nov. 1777; d. 6 Jan. 1852. His public career as journalist and stenographer was nearly parallel with representative government in France. He was present as stenographer at the session of 10 Aug. 1792, when the power passed from the hands of an individual to those of an assembly; and of 2 Dec. 1851, when it passed from the hands of an assembly to those of an individual. His services were also in constant requisition at the courts as an interpreter for English, German, Italian, Spanish, Dutch, and Flemish suitors. He was a frequent contributor to the 'Dictionnaire de la Conversation,' and among other papers wrote the article on stenography.

Breton, Jules Adolphe, zhül ä-dölf, French painter: b. Courrières 1 May 1827; d. Paris 5 July 1906. He was educated at St. Omer and at Douai, and studied under Félix Devigne and at Drölling's atelier in Paris. The subjects of his earlier pictures, such as 'Misère de Désespoir' (1849), were taken from the French revolutionary period; but he soon turned to the scenes from peasant life which he has treated in a most poetic and suggestive manner, with an admirable union of style with realism. In 1853 he exhibited 'La Retour des Moissonneurs' and in 1855 his celebrated 'Les Glaneuses.' He is represented in the Luxembourg by 'La Bénédiction des Blés' (1857), admirable for its rendering of sunlight; 'Le Rappel des Glaneuses' (1859); and 'Le Soir' (1861). His later works were simpler in their component parts and larger in the scale of their figures, and of these 'La Fontaine' is a typical example. Breton was also known as a poet.

Breton, de los Herreros, brä-tôn' dā lōs ä-rä-rōs, Don Manuel, Spanish dramatist: b. Quel, province of Logroño 19 Dec. 1800; d. Madrid 13 Nov. 1873. He was the most notable Spanish poet of the first half of the 19th century. He gave to the Spanish stage 150 plays, some of them original, others derived from ancient Spanish sources, or translated from French or Italian. In him the old French comedy finds not so much an imitator as its last true representative. Among his best original

BRETON LITERATURE — BREUGHEL

comedies are: 'I'm Going Back to Madrid,' 'Here I am in Madrid,' 'This World is All a Farce,' 'Die Once and You'll See.' He was less successful in the historic drama than in comedy.

Bret'on Literature. See CELTIC LANGUAGE AND LITERATURE.

Brets, Brettys, or Brits, Britons, the name given to the Welsh or ancient Britons in general; also to those of Strathclyde, as distinguished from the Scots and Picts.

Bretschneider, brët'shni-dër, **Heinrich Gottfried von,** German writer: b. Gera, 6 May 1739; d. 1 Nov. 1810. He was educated at the institute of Herrnhuters at Ebersdorf, entered the army as a cornet in the regiment of Count Brühl, was present at the battle of Kolin, and afterward became captain of a Prussian free-corps, and was made prisoner by the French. During his forced stay in France he acquainted himself with the language, and with the spirit of the people. On his return he was appointed governor of Usingen in Nassau. This government being shortly suppressed, he traveled in England and France, and became associated with Count Vergennes, who employed him in diplomatic missions. He returned to Germany in 1772, and was shortly afterward engaged in the service of Austria, where he was first named vice-governor of the banat of Temesvár. This banat having been incorporated in Hungary in 1778, he obtained the appointment of librarian to the University of Buda. Here his hostility to the monks, and especially to the Jesuits, led him into trouble; although the Emperor Joseph II., who held the same views, declared himself his protector. He was obliged to retire from Buda, and was appointed librarian at Lemberg, and also counselor to the government. In 1809 he retired with the title of aulic counselor. His views were liberal and somewhat sceptical, and with his active opposition to the monastic orders, gained him many enemies. His principal works are: 'Reise nach London und Paris' (1817); 'Almanach der Heiligen' (for the year 1788); 'Walters Leben und Sitten' (1793).

Bretschneider, Karl Gottlieb, German theologian: b. Gersdorf, Saxony, 11 Feb. 1776; d. Gotha, 22 Jan. 1848. He studied theology at Leipsic, was appointed pastor at Schneeberg in 1807, general superintendent at Gotha in 1816, and afterward counselor of the Upper Consistory there. Bretschneider established a reputation as a sound and judicious thinker of rationalistic bias, and his theological writings are admitted to have a permanent value. In 1820 appeared his 'Probabilia de Evangelii et Epistolarum Johannis Apostoli Indole et Origine,' an attack upon the Johannine authorship from internal evidence, and in 1824 his 'Lexicon Manuale Græco-Latinum in Libros Novi Testamenti.' Another work of importance is his 'Handbuch der Dogmatik' (4th ed. 1838). Bretschneider also wrote on many other theological questions and controversies.

Bret'ten, a town of Baden, Germany, the birthplace of Melancthon, 16 miles east-northeast of Carlsruhe by rail. The house in which Melancthon was born belongs now to a foundation bearing his name for the support of poor students, established in 1861. A monument was erected in 1867.

Bretts and Scots, Laws of, the name given in the 13th century to a code of laws in use among the Celtic tribes in Scotland, the Scots being the Celts north of the Forth and Clyde, and the Bretts being the remains of the British inhabitants of the kingdom of Cambria, Cumbria, or Strathclyde, and Reged. Edward I. issued in 1305 an ordinance abolishing the usages of the Scots and Bretts. Only a fragment of them has been preserved.

Bretwalda, brët-väl-da, a title applied to one of the Anglo-Saxon tribal chiefs or kings, who, it is supposed, was from time to time chosen by the other chiefs, nobility, and ealdormen to be a sort of dictator in their wars with the Britons. The following are mentioned by Bede, but Hallam and other historians doubt whether any sovereign in those early times possessed such authority: 492 A.D., Ella, king of Sussex; 571, Ceawlin, king of Wessex; 594, Ethelbert, king of Kent; 615, Redwald, king of the West Angles; 623, Edwin, king of Deira; 634, Oswald, king of Bernicia; 643, Oswy, king of Bernicia.

Breughel, bré-něl, the name of a celebrated Dutch family of painters, the first of whom adopted this name from a village not far from Breda. This was Pieter Breughel, also called, from the character and subject of most of his representations, the "Droll" or the "Peasants' Breughel." He was born in 1510 (according to Mechel, in 1530), was a pupil of Peter Koeck van Aelst, traveled in Italy and France copying the beauties of nature, and after his return fixed his residence at Antwerp, where he was received into the Academy of Painters in that place. He subsequently married the daughter of his instructor, Koeck, and removed to Brussels, where he died in 1570 (according to some in 1590). In his rural weddings, his rustic feasts and dances, he strikingly represents the gaiety of the villagers, as he himself had frequently observed them, in disguise, in his youth. He also etched, but many of his pictures have been engraved by others. He left two sons — Pieter and Jan. The former (called the Younger Breughel), preferring subjects affording striking contrasts, painted many scenes in which devils, witches, or robbers are the principal figures. This particular turn of genius procured him the name of "Hell Breughel." Among his pieces are: 'Orpheus Playing on his Lyre Before the Infernal Deities,' and also 'The Temptation of St. Anthony.' The former picture hangs in the gallery of Florence. The second brother, Jan, was distinguished by his landscapes and small figures. From his usual dress he received the title of "Velvet Breughel." He also painted for other masters landscapes as backgrounds to their pieces, and sometimes little figures in them. He was a very prolific artist. In connection with Rubens he represented Adam and Eve in Paradise. The figures in this picture are painted by Rubens. This piece, his 'Four Elements,' also 'Vertumnus and Pomona,' which were all executed jointly with Rubens, are among his principal performances. He is said to have been born in 1568; other authorities say 1569, 1575, or 1589. He visited Italy, and enriched his imagination with beautiful scenery. He is said to have died in 1642, or by other authorities 1625. Other members of this family, belonging to a later period,

are Ambrose, who was director of the Antwerp Academy of Painting between 1635 and 1670; and Abraham, who for a time resided in Italy, and died in 1690; the brother of the latter, John Baptist, who died in Rome; and Abraham's son, Caspar Breughel, known as a painter of flowers and fruits.

Breve, brêv, a note of the third degree of length, and formerly of a square figure, as \square ; but now made of an oval shape, with a line perpendicular to the stave on each of its sides: || . The breve, in its simple state, that is, without a dot after it, is equal in duration to one quarter of a large, or to two semibreves, and is then called imperfect; but, when dotted, it is equal to three eighths of a large, or to three semibreves, which being the greatest length it can assume, it is then called perfect. It is now chiefly used at the close of passages or compositions.

Brevet, a term borrowed from the French, and applied in the United States and Great Britain to rank in the army conferred upon officers on account of special and long service, and higher than that for which regimental pay is received. Thus a brevet-major serves as captain in his regiment, and draws pay as such.

Breviarium of Eutropius, the only existing work by Eutropius. It is a treatise in 10 brief books or chapters, recounting the history of Rome from the foundation of the city to the time of Valens, 364 A.D. Its style is notably good and the work has been much drawn upon by later writers. The best critical edition of 'The Breviarium' is that by Droysen.

Breviary (from the Latin *breviarium*), a summary or abridgment of prayers. The breviary is the book containing the daily offices which all who are in orders, or enjoy any Catholic benefice, are obliged to read. It is an abridgment of similar offices previously in use. The breviary contains prayers or offices to be used at the seven canonical hours of matins and lauds, prime, tierce, sext, nones, vespers, and compline. It is not known at what time the use of the breviary was first enjoined. In the Acts of the Apostles we find the third, sixth, and ninth hours especially mentioned. From Clement of Alexandria, Tertullian, Cyprian, and others, we learn that the observance of these hours was general among Christians. St. Basil, St. Jerome, and St. Ambrose speak of the seven hours called canonical. The services in use in the convents and monasteries in the early ages were very exhaustive from their great length. A council held at Tours in 567 enjoined that matins and vespers should never have less than 12 psalms each, and that the former should have 30 in Lent. It was under Pope Gregory VII. (1073-85) that the abridgment of the offices began to be considered necessary. In 1241 a breviary revised by Haymon obtained the approbation of Gregory IX., and was introduced in all the churches of Rome under Nicholas III. In 1568 Pius V. published a breviary which has remained, with few modifications, to the present day. The Roman breviary, however, was never fully accepted by the Gallican Church, which persisted in maintaining its own offices. The Ultramontane party there had long struggled in vain for the introduction of the Roman breviary, but from 1840 to 1864, by a final and vigorous effort, the opposition of the Gal-

lican party was overcome, and the uniformity of usage generally established, though to the dissatisfaction of a large number of French Catholics.

The Psalms occupy a large place in the breviary, the order of the reading being so arranged that in general 100 psalms shall be recited in a week. Passages from the Old and New Testament and from the fathers have the next place. All the services are in Latin, and their arrangement, which is adapted to the various seasons and festivals of the Church, is very complex. The English Book of Common Prayer is based on the Roman breviary. There is a translation of the breviary into English by the Marquis of Bute (1880).

Breviary of Alaric, a compendium of Roman law dated from the first decade of the 6th century and compiled at the command of Alaric II., king of the Visigoths. It consisted of abridgements of the code and novels of Theodosius, the institutes of Gaius, etc., and contained a detailed commentary styled the 'Interpretatio.' It was intended for the Roman subjects of the Visigothic ruler, and must not be confused with the 'Forum Judicum' or 'Judicum Liber,' which Alaric put forth for his barbarian vassals. See Lee, 'Historical Jurisprudence' (1900).

Brevipennes, a family or subdivision of birds, but occupying a different position in different systems. Cuvier makes it a family of the order *Grallæ* or waders. In more modern systems it corresponds to the order of Cursorial birds or *Ratitæ*. It includes at least two genera, the ostrich and the cassowary. The Dodo and *Apteryx* are also referred to it. The Brevipennes have a resemblance in several of their distinctive characteristics to the *Gallinacea*. Their pectoral muscles are reduced to extreme tenuity, and the sternum has no ridge, while the muscles of the thighs are of great strength and thickness. They are thus fitted for walking or running, rather than for flying. As their name implies their wings are short.

Brevoort, James Renwick, American artist: b. Westchester County, N. Y., 20 July 1832. His art studies were made chiefly in Europe, where he spent several years sketching scenes in England, Holland, and Italy. In 1861 he was elected an associate of the National Academy, and in 1863 a full member. Since 1872 he has been its professor of perspective. His specialty as a painter is landscape work, and the following pictures of his are well known: 'Lake of Como' (1878); 'Storm on English Moor' (1882); 'New England Scene'; 'Morning in Early Winter' (1884); 'The Wild November Comes at Last'; 'Windy Day on a Moor' (1886).

Brewer, David Josiah, American jurist: b. Smyrna, Asia Minor, 20 June 1837; d. 28 March 1910. He graduated at Yale College 1856, at Albany Law School 1858. He studied law under his uncle, D. D. Field, and was admitted to the bar in New York in 1858. Removing to Kansas, he became prominent in his profession. He was judge of the supreme court of Kansas 1870-81, and was appointed United States judge for the 8th circuit in 1884. He rendered a memorable decision on the Kansas Prohibition Law, affirming the right of liquor manufacturers to compensation, for which he was

BREWER—BREWING AND MALTING

severely criticised by the Prohibitionists. President Harrison elevated him to the supreme court of the United States in 1889. He was made a member of the Venezuelan commission by President Cleveland in 1896, and was chosen its chairman.

Brewer, John Hyatt, American musician: b. Brooklyn, N. Y., 1856. He studied piano, organ, and theory under local teachers, particularly Dudley Buck. He has filled the position of organist at the Church of the Messiah and the Clinton Avenue Congregational Church, Brooklyn, and since 1881 at the Lafayette Avenue Presbyterian Church in that borough, where he is also professor of vocal music at Adelphi College. His compositions include church music, vocal music, and works for the piano, organ, and orchestra.

Brewer, Leigh Richmond, American Protestant Episcopal bishop: b. Berkshire, Vt., 20 Jan. 1839. He was ordained in 1867, and after serving as rector of Grace Church, Carthage, N. Y., 1866-72, and Trinity Church, Watertown, N. Y., 1872-80, was consecrated missionary bishop of Montana in the year last named.

Brewer, Thomas Mayo, American ornithologist: b. Boston, Mass., 21 Nov. 1814; d. 23 Jan. 1880. He was graduated at Harvard College in 1835, and was editor of the *Boston Atlas* in 1840. He edited Wilson's 'Ornithology' and 'Birds of North America,' and, in conjunction with Baird and Ridgeway, wrote 'A History of North American Birds.'

Brewer, William Henry, American agricultural scientist: b. Poughkeepsie, N. Y., 14 Sept. 1828. He was graduated from the Sheffield Scientific School, New Haven, in 1852, and has been professor of agriculture there from 1864. He has been a member of the National Academy of Sciences from 1880, of the Connecticut State board of health from 1892, and of the State board of agriculture for a long period. He has been one of the most prominent American leaders in agricultural research and is a valued authority on all related topics. Besides contributing to the 'Report on Cereal Production' in the United States Tenth Census (1883), he has edited the 'Botany of California' (1886).

Brewerton, Henry, American soldier: b. New York, 1801; d. Washington, D. C., 17 April 1879. He was graduated with the class of 1819 at West Point. Commissioned second lieutenant in the corps of engineers, he first served as assistant in determining the 45th degree of north latitude at Rouse's Point, N. Y. He was assistant and professor of engineering at West Point (1819-21). Thereafter he was almost continuously engaged in such important engineering works as repairing the fortifications in New York harbor, construction of Fort Jackson, La., of Fort Adams, Newport, R. I., of the defenses of Charleston harbor, S. C., of the fortifications and improvements of Baltimore harbor (1861-4), and of Forts Monroe and Wool, for the defense of Hampton Roads, Va. He was brevetted brigadier-general in the United States army, 13 March 1865, for long, faithful, and meritorious services, and was retired from active service 7 March 1867, "having been borne on the Army Register more than 45 years." Dickinson College conferred the degree of LL.D. upon him, 8 July 1847.

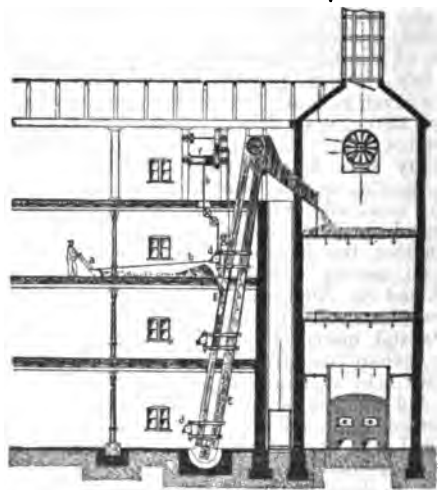
Brewing and Malting. Brewing is the process of making fermented drinks, such as ale, beer, cider, etc. See BEER.

MALTING.—Malting is the preparing of cereals by germination or growth for the process of mashing. Barley is the grain commonly used for making malt for lager beer, ale, stout, vinegar and yeast-makers' or distillers' mash, etc., while wheat malt is used to a large extent in the production of weiss beer.

The barley is first cleaned in order to remove foreign seeds, straw, broken kernels, etc., by means of sieves and blower fans. As the character of the beer depends largely upon that of the malt, and as the latter's character can be determined during malting, it follows that there are various methods of details in malting. The following are the general manipulations employed:

Steeping.—Malting is in reality an artificial or forced growth of a seed, the changes taking place being similar to those when the seed is planted in the soil. The first requisite is moisture. This is given to the grain by placing it in steep tanks containing water of a certain temperature. Steep tanks are cylindrical iron vessels having conical bottoms so that all the grain will drop out when tank is emptied. They are generally placed on the top floor of the malthouse. The grain remains in the steep tank until it has absorbed the desired amount of water, the time differing for different kinds and quality of grain or the process of the maltster. For barley the duration of steeping is generally from 36 to 60 hours, averaging about 48 hours.

Growing or Germinating Floors.—The malt-house usually consists of several floors. The water in the steep tank is drained off and the



Floor Malt House with Power Shovel, and Bucket Elevator for Green Malt.

wet barley dropped upon these floors below. The barley is now spread in heaps of about 12 to 14 inches high (occupying rather more than one third and less than one half of the floor space). The barley now dries out somewhat and begins to sprout or grow and small hair-like fibres, called rootlets, begin to show. As heat is generated during growth, which is undesirable above a certain temperature, and as further

BREWING AND MALTING

proper growth requires pure air, it is necessary to aerate the growing barley (now called green-malt). This is done by what is called "turning the heap," which consists of reshoveling the green malt in such a manner that the lower kernels of the old heap will be at the top in the new heap. (During turning, the green malt is thrown through the air in a thin sheet or stream, whereby it is aerated and cooled. The new heap now occupies a larger floor space, is consequently of less height on the floor.) This turning is repeated at regular intervals so that at the end of the growing period the heap covers the entire floor to a height of from five to six inches. This growth usually takes about five days, during which time water is sprinkled upon the heap whenever it becomes too dry.

Kilning or Drying.—After the green malt shows the desired degree of sprouting, it is necessary to quickly check further growth. This is done by drying it upon the kiln. The green malt is shoveled by means of a power shovel to one end of the floor where it drops through an opening into a bucket elevator and is conveyed to the kiln. The kiln usually has two floors placed one above the other made of strips of wire or perforated sheet metal and heated by means of an open fire from below. Above the upper floor, in the dome, drafts are placed to carry off the vapors, but in modern constructions suction fans are used to promote drying. The green malt is spread evenly upon the upper kiln floor about 18 inches high, where it remains for 24 hours, during which time it is only partially dried. It is now dumped or dropped upon the lower floor (commonly by mechanical dumping floors which turn open in sections on an axis or bearing like the grate in a furnace). The malt on this lower kiln is again spread evenly and then subjected to a higher temperature until the desired degree of dryness is obtained, which usually takes from 20 to 24 hours.

Malt Cleaning.—The malt as it comes from the lower kiln is not yet suitable for brewing as it contains the rootlets and some kernels that were crushed or injured on the floors or during conveying. The malt now passes through cleaning machines consisting of sieves and blowers which remove the rootlets, dust and small and broken kernels.

Mechanical Malting.—As floor malting is restricted to only the cooler months of the year and possesses other disadvantages as to cost of labor and buildings, mechanical systems are coming more and more into use. The steeping of the grain as well as the kiln drying, however, remain generally the same as in the floor system.

Pneumatic Floor Malting.—This system employs box-shaped compartments to hold the grain during the growing period. Through this receptacle air that has been purified and given the proper degree of moisture, as well as cooled or warmed to the proper temperature, is circulated. The conditions of temperature and humidity can thus be made the same all the year round no matter what the conditions of weather may be outside. The green malt in this system is not turned by hand, but by a series of screws or propellers driven by power, traveling through it at regular intervals.

Drum Malting.—The advantages here are similar to those stated above. The drums con-

sist of two concentric cylinders having the same ends. In the space between the cylinders the steeped grain is placed, this space not being filled quite full. The cylinders are perforated with small holes so that moistened or heated or cooled air can be forced through the grain from the centres or sucked through from the outside. By revolving the drum the grain is constantly tumbling, that is, the kernels nearest the inside cylinder fall against the outside cylinder, and this in connection with the air current passing through gives the same turning and aeration to the grain as in turning a heap in floor malting, and requires no labor. There are several systems of malting drums, differing principally in the manner in which the air is warmed and moistened and the direction in which it is forced through the drum.

BREWING.—Brewing Materials.—The materials used in the United States are principally the following: Barley malt is the most important and generally used. It gives to the beer not only its substances, but also to a great extent its character. Malt also supplies peptase and diastase, two substances that change the nature of certain other constituents during mashing. Peptase changes the insoluble albuminoids of the malt into soluble or desirable ones. Diastase changes the unfermentable starch contained in the malt and other materials into fermentable sugars and dextrins.

Caramel and black malt, consisting of ordinary malt that has been treated differently during malting, are used to impart color to the wort in order to produce darker beers, also to impart to the beer a more pronounced malt aroma or flavor. Only a small amount, proportionately, of these are used mixed with other materials.

Malt adjuncts or other starch containing materials, and brewing sugars are used for the triple purpose: of producing more durable beers, since these adjuncts contain very little albumen; of producing paler beers than could be made with malt alone; and for reducing the cost of production. These are rice and corn products, such as corn grits, corn meal, corn starch, corn flakes, and brewing sugars, glucose, etc. Flakes are made by steaming corn grits and passing them through hot steel rollers in order to change them so as to dissolve better during mashing. Flakes and sugars, such as grape sugar, glucose, etc., are sometimes used, instead of corn grits or rice (which require cooking) when a cooker is not installed. Flakes are added directly to the mash in the mash tub, and sugars to the wort in the kettle. Brewing sugars are used to a moderate extent only as a brewing material for lager beers, finding more extended use in the production of English beers such as ale, stout, etc.

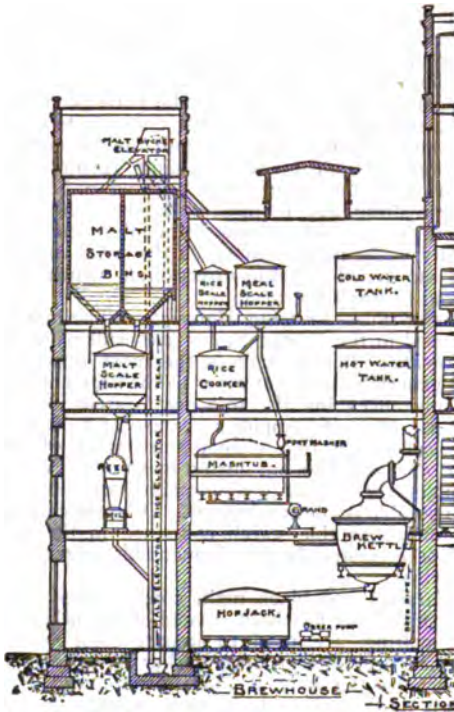
Hops are added to the boiling wort for the purpose of imparting (1) tannin, which aids in the elimination of undesirable albuminoids in the wort; (2) hop oil, which gives the beer its hop aroma, and (3) hop resin, which gives the beer its bitter taste and furthermore tends to preserve it. Water acts as a solvent for the substances contained in the beer. Its composition has considerable influence on the character of the beer produced. It must contain certain mineral substances. See Hops.

Brewing Operations.—Modern breweries are usually divided into three departments, namely,

BREWING AND MALTING

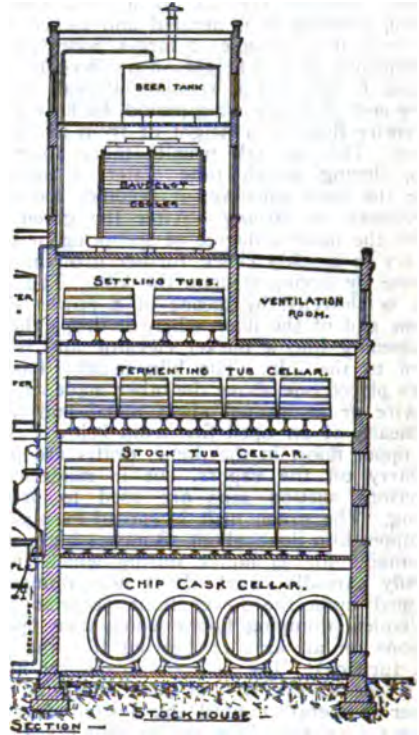
the elevator or mill house where the materials are prepared and weighed; the brew house, where the wort is produced, and the cellars

ferred to the storage hoppers in the brew house ready for use. Rice and corn goods are either stored in the mill house, weighed in bulk and elevated to a storage hopper in the brew house, or dumped (usually in smaller breweries) directly from the sacks into the cooker.



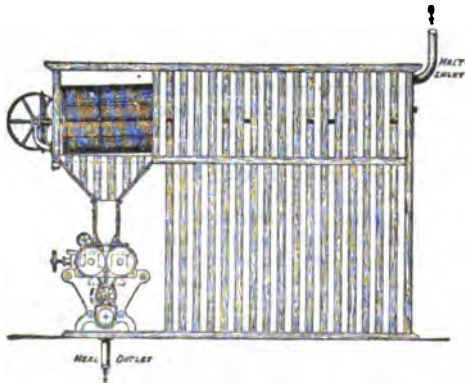
Mill and Brew House.

where the wort is fermented and treated to produce the finished beer. The arrangement is on the gravity plan, that is, in each department the material of wort or beer is elevated or



Gravity or Tower Brewery Cellars.

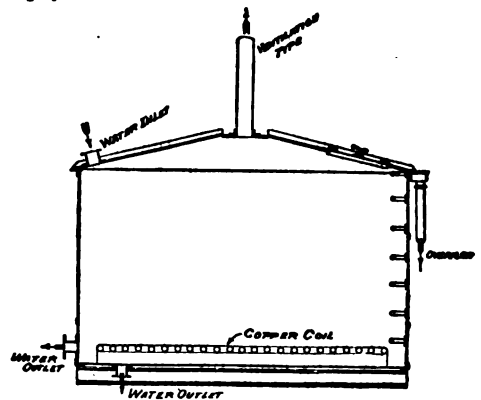
Brew House.—The brew house generally contains the following vessels: hot and cold water tanks; malt and cereal (rice or corn) hoppers; the cereal cooker, mash tub, kettle, and hop jack and cooler.



Malt Mill and Screening Reel.

pumped only once to the top and from there descends through the different stages of manufacture by gravity.

Elevator or Mill House.—Here the malt is cleaned and stored. The desired amount of malt for the beer is weighed out in a scale hopper, and from thence passes through the malt mill where it is crushed so as to loosen the starch in the kernels. The crushed malt is then trans-



Hot Water Tank, Sectional View.

Mashing in Cereal Cookers.—Cookers are of two kinds; open ones or, as they are usually called, rice tubs, and closed or pressure cookers.

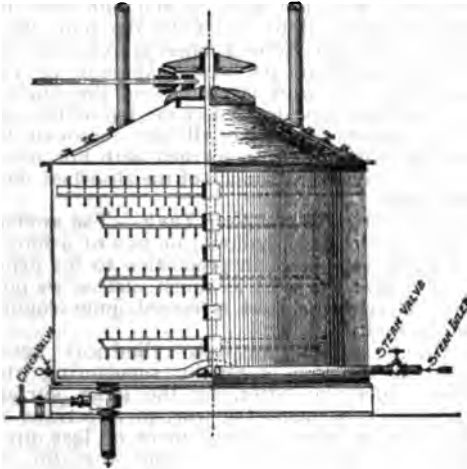
BREWING AND MALTING

In these vessels rice or corn (grits or meal) is boiled for a certain length of time in order to loosen up or soften the hard flinty condition of their starch so as to render it able to be more completely dissolved or acted upon in the mash tub. Crushed malt to the amount of about one quarter the weight of corn goods is added in the open cookers. The mashing method in the

than in open cookers. Hereby a more complete softening or dissolving of the starch is obtained and consequently a better yield or extraction of the materials.

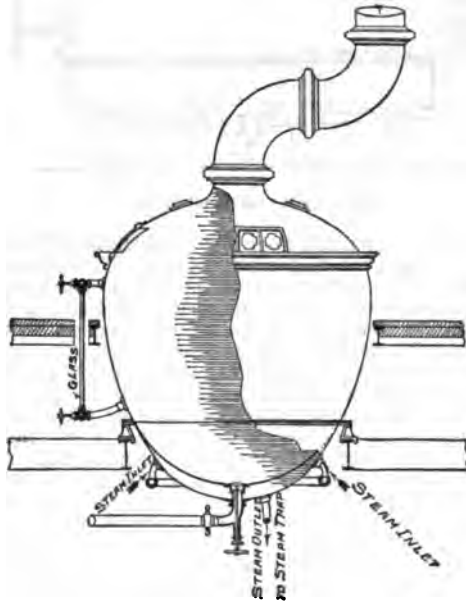
Mashing in Mash Tubs.—The mash tub, like the open cooker, has a stirrer, and a heating coil, but is further supplied with a strainer or perforated false bottom for clarifying the wort, and a sprinkling device or sparger for washing out the grains. In the mash tub the mash is started and, when the mash from the cooker has been added, the combined mash is finished. The mashing method here varies considerably depending upon the character of the beer that is to be produced, and is consequently one of the most important of the brewing operations.

The method of mashing for the production of a beer of average character is approximately as follows: The crushed malt and water are mixed so as to have a temperature of 30° R. (100° F.) and the mash allowed to rest at this temperature



Cooker, showing Stirrer and Steam Connection.

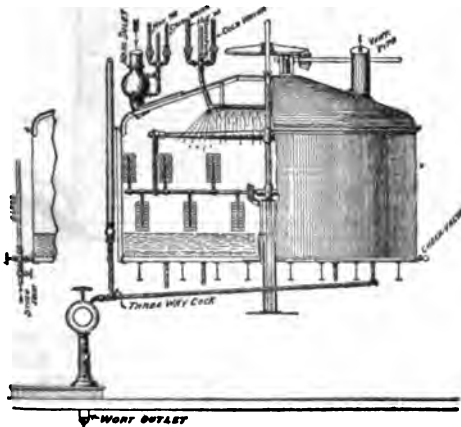
open cooker varies somewhat among different brewers, the following being about the average method: The materials are mixed with water so as to have a temperature of 30° R. (100° F.). The mash is held at this temperature for about 15 minutes then run up to 56° R. (158° F.), and held for 30 minutes, then heated quickly to boiling and boiled from 45-75 minutes for corn goods depending on the fineness of the material, and 30 minutes for rice. The cereal mash is then run down to the mash tub where the mash is finished. Pressure cookers are used to some



Brew Kettle, showing Liquid Gauge, Steam Jacket, and Steam Connections.

for one hour. The temperature of the mash is now raised to 54° R. (153° F.) to 55° R. (156° F.), in about 15 to 20 minutes, by running in the boiling corn or rice mash from the cooker (with the addition of steam should same be necessary). This temperature is held for 10 to 15 minutes, during which time the stirrer is operated continuously. It is at this stage that the diastase in the malt inverts or changes both the starch contained in the malt as well as that in the corn or rice into unfermentable dextrin and fermentable sugars.

The mash is now heated with steam and hot water, in 15 to 20 minutes, to 59° R. (165° F.) and the stirrer stopped. The mash is now allowed to rest from 30 minutes to one hour in order to allow the hulls of the malt to settle so as to act as a filtering material for the wort, after which the wort is run into the kettle.



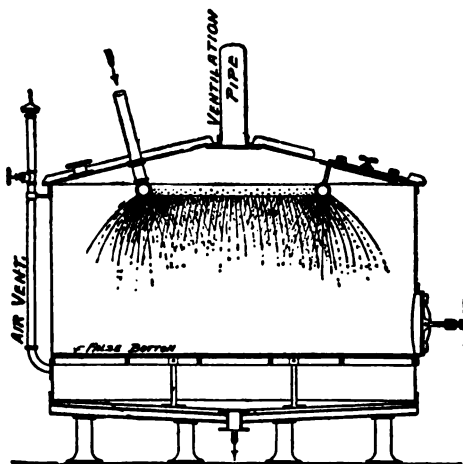
Mash Tub with Foremasher, Liquid Gauge, Attenuating Device and Three-way Cock.

extent, but not generally, in American breweries. They differ from the open cookers in that, being closed the mash can be boiled under pressure and consequently, at a higher temperature

BREWING AND MALTING

After the wort has run off, the solid substances remaining in the mash tub, called grains, are washed out or sparged with water in order to recover as much of the wort contained in them as possible. The grains are then thrown out of the mash tub and sold as cattle feed.

Boiling the Wort in Kettle.—The kettle consists of a pear-shaped copper vessel having a double or jacketed bottom for heating the wort,



Hop Jack, Sectional View.

and a vent pipe to roof for conducting off the vapors generated during boiling. The steam outlet of the coil or jacketed bottom is connected to a steam trap which automatically discharges the water condensed in the coil or jacket without materially reducing the pressure of the steam. The wort as soon as it runs clear from the mash tub is collected in the kettle. Steam is turned on in the kettle as soon as the jacketed bottom is covered with wort. This wort, and that continuously running in is then heated to and kept at about 70° R. (190° F.) in order to destroy the action of the diastase and prevent further saccharification in the wort taking place. When the kettle is full or nearly so, steam is further turned on and the wort brought to boiling and boiled for one hour when it should show a good "break." During this boiling the undesirable albuminoids are precipitated in finely divided form, rendering the wort turbid. Upon continued heating these albuminoids unite or lump together and leave the wort between these lumps clear and transparent. This clarification is called the "breaking" of the wort.

Hops are now added, usually about two fifths of the total amount used, after which addition the wort again becomes turbid due to the further precipitation of albuminoids by the tannic acid contained in the hops. After about 40 minutes further boiling the wort should again clarify or show its second break when another two fifths of the hops are added and the wort boiled about 20 minutes. The remaining one fifth of the hops are added and the wort run out of kettle into hop jack immediately. This last quantity of hops is usually of a better quality and is not boiled with the wort as its addition is for the purpose of imparting the hop aroma to the wort. This aroma is due to the hop oil of the hops which is volatile at boiling

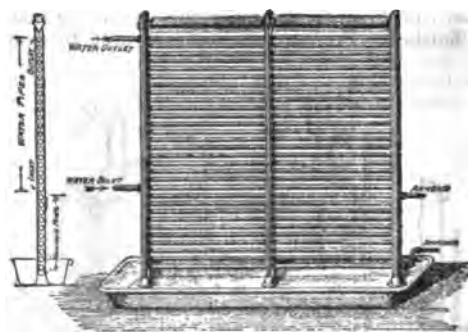
temperature and would escape, and be rendered useless, if the wort were boiled for any considerable time. All or part of this last hop addition is sometimes placed in the hop jack and the boiling wort run upon it.

Wort in Hop Jack.—The hop jack consists of a round or square iron tank, having a perforated false bottom or strainer and a sparger or sprinkler similar to that of the mash tub. The wort, with the hops, is run into the hop jack and allowed to rest until the hops have settled so as to form a filtering material for the clarification of the wort. As soon as this takes place the wort is pumped to the surface cooler or beer tank located at the top of the cellars. After the wort has all been removed the hops are washed out or sparged with hot water in order to recover as much of the absorbed wort as possible.

Surface Cooler and Beer Tank.—The surface cooler consists of a shallow iron pan of a length and width very large in proportion to its depth so as to give the wort as much surface as possible. Hereby the wort is cooled quite rapidly and aerated.

The beer tank, an iron cylindrical vessel closed at the top, is rapidly supplanting this cooler, since the latter, by the large surface it presents, endangers the wort to infections by impurities or germs always more or less present in the air. As soon as the wort on the surface cooler or in the beer tank cools to about 50° R. (145° F.) the danger of its infection by impurities, bacteria, etc., begins. From this stage until the beer is finally marketed, months later, it requires the daily, almost hourly vigilance of the brewer to keep it pure and free from contamination.

Baudelot Cooler.—This consists of a series of pipes or tubes arranged in vertical tiers, over the outside of which the wort flows, while through them the cooling medium is circulated.



Baudelot Cooler.

It is usually made in two sections, the upper being of copper tubes, containing cold water, and the lower of steel containing ammonia.

The Cellars.—The wort after cooling enters the cellars, where it is fermented, stored kraeusened bunged, fined, filtered, and racked ready for the market.

Fermentation of Wort.—The wort as it comes from the cooler is run into fermenting tubs in which the yeast has previously been placed. Sometimes the yeast is added after the tubs are filled with wort. The yeast, from one to

BREWING AND MALTING

one and a half pounds to the barrel of wort, is usually given, not in its natural state, but first mixed with an equal quantity of wort and thoroughly aerated.

The fermentation now begins. Within 15 to 24 hours white bubbles appear on the surface around the sides of the tub. The wort at this time is covered with a head of thick, lumpy consistency composed largely of albuminoid matter. The whole surface now soon becomes covered with a fine white froth, which soon changes to a frizzled appearance called "kraeusen" stage. The froth head then moves toward the centre, the fermentation becomes more active, the froth head rises higher and becomes darker and the fermentation now passes into the "high krausen" stage, generally after about 70 to 80 hours. This stage is maintained for about 48 to 72 hours when the head begins to collapse and deepens in color to the end of the fermentation. The temperature is then gradually reduced by means of cooling apparatus to 3° R. (39° F.) in the next 3 or 4 days. Total duration of fermentation, 10 to 11 days.

Storage of Beer.—After the wort is fermented the beer is filled into storage vats (closed at the top) where it is stored at a temperature near the freezing point for about two or three months. During this storage period there is a slight progress of secondary or after fermentation and the yeast settles, and, what is most important in bottle beer that is to be pasteurized, there is a further precipitation of albuminoids.

Chip Cask Treatment.—When sufficiently matured in storage the beer is run or pumped into the chip casks, so called because in them wooden chips are placed to retain the sediment produced by the finings. In the chip cask, two properties must be imparted to the beer that it did not possess during storage, namely, life or proper amount of carbonic acid gas contents, and brilliancy. Life is given the beer by addition of 8 to 10 per cent of krausen, (that is, young beer in the first, or krausen stage of fermentation). This when added to the old "flat" storage beer continues to ferment, and, as the casks are closed the gas generated gives life to the whole amount of beer contained.

For bottle beer, krausen made from grape sugar is used, as grape sugar contains no albuminoids as does the krausen from regular fermenting worts.

Brilliancy is given to the beer by removing the yeast and other particles in suspension by means of finings made from isinglass. After bunging the cask, a certain pressure only (4½-5 pounds) is desired and any excess pressure generated above this is automatically removed by an automatic blow-off device called the bunging apparatus.

Filtration of Beer.—Although beers will generally become clear in the chip cask if they are left there long enough, they are now almost universally filtered after they have become moderately fine (clear) in the chip cask. Thereby much time is saved, also a large part of the finings and chips. Furthermore, filtration furnishes a more brilliant beer than can generally be obtained by chip cask treatment only. Modern beer filters differ considerably in construction, but are all alike in that they contain several or

many compartments or cells filled with filter mass or pulp (a substance similar to blotting paper) through which the beer is forced. The filter mass or pulp can be used again and again, being washed after each use to remove the beer and sediments it collects during filtration. The operation of filtration is as follows: The bunging apparatus is disconnected and air pressure (15 to 20 pounds) is put on the chip cask and the beer thereby forced through the filter.

Racking of Beer.—From the filter the beer passes to the racking bench which must be placed at a higher level in order to cause a back pressure upon the filter and prevent foaming. The racking device consists of two or more faucets of which one is always open so as to give a steady flow of beer.

Carbonating.—Beer is often carbonated. This is the mechanical forcing of carbonic acid gas into the beer by which time, labor, space, and cost of chip casks are saved, besides obtaining a more durable beer.

Pitching and Varnishing.—In order to prevent the beer in wooden vessels from soaking into the wood, they are coated on their insides with an inert or insoluble substance. This is shellac varnish for the large brewery vessels, and pitch for the trade packages.

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BREWING AND MALTING

COMPOSITION OF VARIOUS BEERS AS PER ANALYSIS MADE BY THE WAHL-HENIUS INSTITUTE OF FERMENTOLOGY, CHICAGO, ILL. (FIGURES DENOTE PER CENT.)

AMERICAN LAGER BEERS		Time of Analysis	Extract in Beer (apparent)	Extract in original Wort	Alcohol by Weight	Real Extract	Albuminoids	Sugar	Lactic Acid	Ash	Phosphoric Acid	Obtained In
Average of 15 samples.....		1887	4.53	13.73	3.77	6.46	0.51	2.00	0.16	0.194	0.072	Different States
Average of 88 samples.....		1886	4.85	13.30	3.64	6.21	0.50	1.99	0.11	0.20	.....	"
Average of 210 samples.....		1890	3.93	13.45	4.01	5.70	0.56	1.20	0.10	0.18	.....	"
Average of 176 samples.....		1893	3.66	12.53	3.64	5.50	0.39	1.62	.....	.....	.....	"
Beers from 10 different cities.	A.	1895	3.36	12.35	3.72	4.91	0.41	1.29	0.09	.....	0.066	"
	B.	1895	4.64	13.04	3.45	6.15	0.39	1.62	0.120	.....	0.058	"
	C.	1895	4.03	14.23	4.16	5.92	0.44	1.83	0.103	.....	0.080	"
	D.	1895	3.88	13.62	4.41	4.80	0.45	1.39	0.102	.....	0.069	"
	E.	1895	3.82	12.46	3.53	5.46	0.37	1.45	0.135	.....	0.075	"
	F.	1895	2.91	12.18	3.81	4.56	0.33	1.50	0.090	.....	0.053	"
	G.	1895	4.00	11.93	3.26	5.41	0.48	1.97	0.085	.....	0.068	"
	H.	1895	4.97	14.57	3.82	6.73	0.46	3.36	0.126	.....	0.075	"
	I.	1895	3.12	13.45	4.25	4.95	0.33	1.50	0.073	.....	0.060	"
	J.	1895	3.37	13.10	4.00	5.10	0.35	1.25	0.054	.....	0.060	"
Average of 247 samples.....		1896	3.66	12.93	3.82	5.29	0.46	1.62	0.101	.....	0.068	"
Canadian lager.....		1900	3.15	12.1	3.77	4.88	0.61	1.13	0.072	.....	0.063	"
Mexican lager.....		1900	3.37	12.51	3.77	4.97	.....	1.61	.....	.....	.....	"
Mexican lager.....		.....	.....	13.27	4.01	5.25	0.5	1.114	0.124	0.203	0.080	"
Some typical American tonics.	A.	1895	7.82	17.27	3.83	9.51	0.63	3.87	0.208	.....	0.105	"
	B.	1896	13.74	18.74	2.06	14.62	0.85	9.84	0.113	.....	0.140	"
	C.	1896	7.41	20.78	5.50	9.78	0.64	4.94	0.180	.....	0.107	"
	D.	1896	5.23	17.01	4.87	7.27	0.51	2.00	0.090	.....	0.065	"
	E.	1896	5.47	16.86	4.69	7.48	0.88	2.87	0.212	.....	0.120	"
	F.	1896	5.58	17.46	4.06	9.54	0.77	0.06	0.288	.....	0.155	"
Some typical Am. temperance beers.	G.	1896	28.20	21.70	5.60	10.72	1.26	3.58	0.216	.....	0.144	"
	A.	.....	2.15	6.66	1.88	3.05	0.18	0.85	0.063	.....	0.03	"
	B.	.....	5.56	8.31	1.23	6.07	0.09	2.55	0.036	.....	0.02	"
	C.	.....	3.27	6.66	1.44	3.00	0.19	2.55	0.025	.....	0.025	"
		.....	1.95	6.55	1.94	2.80	.....	.....	.....	.....	.....	"
ALES, PORTERS, STOUTS AND AMERICAN WEISS BEERS		Time of Analysis	Extract in Beer (apparent)	Extract in original Wort	Alcohol by Weight	Real Extract	Albuminoids	Sugar	Lactic Acid	Ash	Phosphoric Acid	Obtained In
Allsopp's India Pale Ale, Red Hand.....		1901	2.23	15.14	5.44	4.70	0.44	0.66	0.144	.....	0.045	Chicago.
McEwen's Sparkling Ale.....		1901	3.35	21.62	7.80	6.05	0.85	2.67	0.378	.....	0.0705	"
Wm. Younger & Co.'s Sparkling Ale, Monk Brand.....		1901	1.87	18.03	6.84	4.90	0.64	0.80	0.153	.....	0.067	"
Olde English Ale, Dog's Head bottling.....		1901	3.92	24.39	8.75	7.59	0.91	1.60	0.162	.....	0.0855	"
American Stock Ales, average of 9 samples.....		1896	3.21	16.73	5.55	5.64	0.46	1.81	0.256	.....	0.061	"
American Cream Ale.....		1901	2.25	13.60	4.75	4.45	0.37	1.06	0.144	.....	0.04	"
American Sparkling Ale.....		1899	3.98	13.98	4.08	5.82	0.40	1.52	0.135	.....	0.06	"
American Sparkling Ale.....		1901	2.15	13.80	4.90	4.40	0.38	0.91	0.135	.....	0.04	"
American Pale Ale.....		1900	3.56	13.05	4.01	5.35	0.37	1.34	.....	.....	.....	"
Canadian Stock Ale.....		1900	3.20	14.45	4.75	5.30	0.51	1.36	.....	.....	.....	"
Stouts.												
Guinness' Extra Bottled Foreign Stout, white label.....		1901	3.40	18.22	6.20	6.15	0.75	0.97	0.243	.....	0.108	"
American Brown Stout.....		1900	5.45	18.15	5.37	7.83	0.56	2.06	.....	.....	.....	"
Porters.												
American Porter.....		1899	2.95	13.25	4.19	4.87	0.40	1.49	0.135	.....	0.061	"
Canadian Porter.....		1900	4.00	14.30	4.37	5.91	0.53	1.31	0.162	.....	.....	"
American Weiss Beers.												
American Weiss Beer.....		1900	2.52	9.29	2.85	3.82	0.57	1.00	.....	.....	.....	"
Weiss Beer.....		1901	2.24	9.28	2.97	3.58	0.42	0.91	0.342	.....	0.036	"
GERMAN, AUSTRIAN AND BOHEMIAN EXPORT BEERS		Time of Analysis	Extract in Beer (apparent)	Extract in original Wort	Alcohol by Weight	Real Extract	Albuminoids	Sugar	Lactic Acid	Ash	Phosphoric Acid	Obtained In
Pilsener, Bürgerliches Bräuhaus.....		1901	3.43	12.83	3.95	5.25	0.42	1.29	0.099	.....	0.063	Chicago.
Pilsener, Genossenschafts-Brauerei.....		1901	4.61	14.29	4.07	6.48	0.52	2.15	0.108	.....	0.0855	"
Pilsener, Anton Dreher.....		1901	2.42	10.80	3.52	4.05	0.34	1.00	0.072	.....	0.050	"
Thüringer.....		1895	3.45	12.59	3.76	5.07	0.41	1.67	0.09	.....	0.08	"
Nürnberg, Tucher.....		1895	5.15	.....	4.31	7.07	0.51	2.06	0.135	.....	0.095	"
Brauhaus Würzburg Export Beer.....		1901	5.35	15.03	4.07	7.22	0.47	2.13	0.099	.....	0.0675	"
Kulmbacher.....		1887	4.50	15.30	4.48	6.80	0.44	1.77	0.24	0.29	0.087	"
Muenchener, Löwen Brauhaus.....		1901	4.13	13.53	3.95	5.95	0.44	1.57	0.090	.....	0.050	"
Muenchener, Pschorr.....		1895	6.12	.....	3.47	7.61	0.40	2.69	0.108	.....	0.08	"
Muenchener, Pschorr Bräu.....		1901	4.40	13.26	3.72	6.12	0.41	1.72	0.072	.....	0.054	"

BREWING INDUSTRY IN AMERICA

Brewing Industry in America. To mar-rate the history of the art of beer-making is to tell a story that is as old as the human race. To trace the art of brewing from its early days down to the present time it is necessary that one should pass through all the ages of antiquity, for the art that was practiced so crudely by the prehistoric peoples was followed with less primitive methods by both the Egyptians and the Assyrians. Later, the Greeks and Romans made their brews, while, from the earliest recorded times, the Teutonic races have pursued this art so successfully that praise of their skill has long taken the form of poem and prose, in song and story, while the tributes of esteem that are everywhere paid to Gambrinus, the acknowledged patron saint of brewing, is but another method by which the lovers of beer strive to testify their appreciation of the beverage for which his name stands synonymous.

As far as America is concerned the history of the brewing industry may be traced to 1620, for when the Pilgrim Fathers landed on Plymouth Rock they brought with them considerable knowledge as to the best methods of making their favorite beverages, the fiery potions which even they loved to drink, "and not a man afraid," as well as the lighter, but still sturdy brews with which every true Englishman sometimes made "merrie." Homebrewed as this beer was in the beginning, the natural growth of the colonies soon suggested that it be put to a more practical use, and it was thus that their knowledge of the brewing craft finally resulted in the establishment of the industry of beer-making.

In the New England colonies, where people were more addicted to the use of stronger spirits than beer, the colonial lawmakers adopted a statute by which they granted immunity from taxes and an additional prize in money to any brewer who should be sufficiently energetic to manufacture more than 500 barrels of "honest beer" in a single year, for they held that beer was a beverage which not only added to the prosperity of the country by giving the farmer a profitable market for the grain he might be able to raise, but which supplied the people with a drink of such mild form that, instead of leading to intoxication, it actually contributed to the spread of that temperate spirit upon which the "good order" of the colony so much depended. It was thus that the infant brewing industry was established and fostered by the colonial officials of Massachusetts, and, though the growth of the industry was slow compared to what one would imagine it should have been, it had expanded sufficiently by 1795 to produce nearly 2,000,000 gallons of beer per annum.

The great adversary against which the brewing industry has been obliged to contend has almost invariably been the result of matters of legislation. Ever since the days of the Egyptians the growth or decline in the art of beer-making may be traced directly to this cause. Under liberal laws, in-

telligently administered, the industry has prospered, while the legislative enactments inspired by ignorance or fanaticism have hampered the expansion of the trade more seriously than it could have been retarded by any other influence. Thus, while we have no reason to believe that any laws directly adverse to the brewing craft were passed prior to 1795, the fact that the legislation that was enacted was more favorable to the cheap distribution of distilled liquors had a tendency to give an advantage to the manufacturers and dealers in strong beverages against which the makers of the milder beers found it difficult to contend. It is true that some of the greatest minds in the country recognized the value of the brewing industry as an aid to the promotion of national temperance, and sought to aid it in every way in their power, but they were opposed by strong influences from several quarters, from the few who were opposed to the drinking of even such a mildly alcoholic beverage as beer, to the strong clique which represented the interests of the manufacturers of and dealers in the more potent liquors. During the Washington administration, Congress, in its consideration of the first federal revenue law, recognized the importance of fostering the brewing industry as an aid to public morality; again, in 1789 Madison publicly expressed the hope that the industry of brewing would extend its influence into every State of the Union, while Thomas Jefferson's firm stand in regard to the liquor question will never be forgotten. "No nation is sober," he said, "where the dearness of fermented drinks substitutes ardent spirits as a common beverage."

Prior to the middle of the 19th century, the term "beer" in the United States generally implied that beverage that is now more commonly known to us as "ale." In 1810, when the production of malt liquors in this country amounted to less than 6,000,000 gallons per annum, the 129 breweries which were manufacturing this product made practically nothing but ale and porter, and it was not until about 1846, when the increasing German immigration created the demand for the favorite beverage of these people, lager beer, that any brewer found it necessary to manufacture such a drink. With them, of course, the Germans had brought a practical knowledge of the art of lager beer-making, and as they were not satisfied with the native brews of the Americans, it was not long before lager beer breweries began to spring into existence in every community in which the German population was sufficiently numerous to support such an enterprise. In the beginning, of course, the Americans were inclined to be suspicious of this new beverage. It was milder than their brews, and, at first, they did not take kindly to it, but, gradually, as time passed, their prejudices were overcome, and, to-day, beer, or in other words, lager beer, has become so thoroughly the national beverage of the American people that the production of ale and porter in the United States does not now exceed 1,000,000 barrels per annum.

BREWING INDUSTRY IN AMERICA

It was the outbreak of the Civil War that brought about the financial exigencies which resulted in the adoption of excise measures more favorable to the production of the lighter beverages. To raise a revenue sufficient to save the Government from the disasters which threatened required heroic measures. It was no time for the display of fanaticism; it was no time for race prejudices to come to the front. What was required was money, and, as the result, the internal revenue laws were created. As these threw burdens of taxation chiefly upon the manufacturers of ardent spirits, the industry of brewing took a new lease of life, and the effect of the passage of these laws, in July, 1862, may be seen in the development of the industry even up to the present day.

It was in 1862, at the moment when it was seen that there was to be an opportunity for the advancement of the brewing industry, that the Brewers' Association was formed. While this organization owed its existence partly to selfish interests, to the desire for self-protection and the better advancement of the trade, its fundamental purpose was a more patriotic one, its members binding themselves together to aid the Government in the perfection of the revenue laws so far as they applied to the manufacture of malt liquors, and to assist by their influence in the collection of such revenues, as well as to secure themselves against the possibility of unjust discrimination. Thus, from the beginning of its history, the Brewers' Association has remained true to its traditions, and, when the throes of the great struggle for national unity had ended, it still continued to co-operate with the Government in all matters relating to the internal revenue. When we remember the meagre 2,000,000 gallons of malt liquors that were produced in the United States in 1795, the following table of statistics indicate the steady development of this industry during the past century more eloquently than any words of mine could picture it:

PRODUCTION OF BEER, 1868—1909.

YEAR	Number of barrels	YEAR	Number of barrels
1868.....	6,146,663	1889.....	25,119,853
1869.....	6,342,055	1890.....	27,561,944
1870.....	6,574,617	1891.....	30,478,192
1871.....	7,740,260	1892.....	31,817,836
1872.....	8,659,427	1893.....	34,554,317
1873.....	9,063,323	1894.....	33,334,783
1874.....	9,600,897	1895.....	33,561,411
1875.....	9,452,697	1896.....	35,826,098
1876.....	9,902,352	1897.....	34,423,094
1877.....	9,810,060	1898.....	37,493,306
1878.....	10,241,471	1899.....	36,581,114
1879.....	11,103,084	1900.....	39,330,849
1880.....	13,347,111	1901.....	40,614,258
1881.....	14,311,028	1902.....	44,540,127
1882.....	16,952,085	1903.....	46,720,179
1883.....	17,757,892	1904.....	48,208,133
1884.....	18,998,619	1905.....	49,522,029
1885.....	19,185,953	1906.....	54,724,553
1886.....	20,710,933	1907.....	58,622,002
1887.....	23,121,526	1908.....	58,814,033
1888.....	24,680,219	1909.....	56,364,360

Whereas, in 1810, there were but 129 breweries in the United States there are now

more than 2,250 such establishments, ranging in size from the little breweries which have been established by enterprising proprietors of German gardens to the enormous beer manufactories with an individual output of more than 1,000,000 barrels per annum. Some few of the breweries make ale, or porter, but the greater number make nothing but the favorite drink of the Germans, the lager beer which must now be considered as one of the great commercial factors in the United States. Moreover, while the American brewers formerly catered exclusively to a restricted local market, within the past 30 years the art of beermaking has attained such a point of perfection that this product can now be shipped, both in barrels and in bottles, from one end of the country to the other, while a further idea of the immense importance of this trade may be gathered from the facts that while the capital invested in this country in the beer industry is not less than \$415,284,468, according to the figures reported by the 1900 census, the annual output of the country shows an aggregate value of more than \$237,000,000. More than 50,000 men are directly engaged in the interests of brewing, and its contributions to the support of the United States, in internal revenue taxes alone, amount to more than \$33,000,000 per annum. That the bottling branch of the industry has also assumed proportions which entitle it to serious consideration is shown by the fact that the product of one brewery alone now amounts to more than 42,000,000 bottles per annum.

While such figures are valuable in the sense that they are reliable manifestations of the growth of the brewing industry, there is a deeper and broader side to the question of its development that is a matter of far greater importance, for the modern brewer, while he is proud of the fact that his craft has grown to be one of the great industries of this great nation, still takes even greater pride in the knowledge that the science of brewing has made more marked scientific advancement during the past 35 years of its history than it had made in all the years that had previously elapsed since those days of "merrie England" when Falstaff and his coterie of jolly fellows joked together over their generous tankards of some foaming brew.

For example, we may say that it has been only within the past 35 years that anything approaching scientific principles have ever been applied to the art of brewing. Since 1870, however, the establishment of brewers' schools to teach the higher knowledge of the craft have brought theory and practice into such close association that a field of competition has been opened that had never existed prior to that time. Thus, during the sixties the principles governing the production of beer were practically the same as those which had been followed by our forefathers in their breweries in 1905, for while every branch of applicable science, including chemistry, bot-

BREWING INDUSTRY IN AMERICA

any and mechanics had experienced marvelous development, these changes meant nothing to the art of brewing, except in the general sense that they were preparing the foundation upon which the more scientific art might be constructed.

The first great improvement in the art of brewing, and especially that portion of it to which the physiology of fermentation may be applied, was the result of the labors of Pasteur in Paris, and Hansen at Copenhagen. From the earliest days beer has been known to be a perishable product, but the character of the causes which made it spoil was a problem that nobody had been able to solve. By his discoveries of the physiology of the organisms of fermentation, Pasteur not only proved that these diseases of beer might rationally be traced to a sort of bacteria, but indicated the manner in which such diseases might be avoided through the application of a process of wort cooling and fermentation, while Hansen went a step farther by not only finding another cause for such diseases in the brewers' yeast, which might easily become, by contact, under certain circumstances, with similar organisms closely resembling it, far more injurious than any bacteria, but brought his labors to a most logical conclusion by developing a process of cultivating yeast in large quantities and in such absolute purity from a single germ that he prevented the introduction of wild yeast into the brew. The immediate adoption of these innovations by the leading brewers of the United States resulted in some very material changes in the practical operations of the breweries. Thus, the discovery of the principle of preventing infection brought about the substitution of suitably closed apparatus in place of the old-fashioned open cooler, but this improvement was simply one step in the efforts of the manufacturers to meet the requirements of the new scientific methods of brewing. It was followed by more ingeniously constructed machinery, all tending toward a cleaner and better product. There were processes for the production of filtered air; there were other processes for the sterilization of water, for everything that now entered into the product must be germ-proof, absolute protection against infection being the keynote of the new science. Under the present methods, therefore, from the very moment that the beer leaves the brew-kettle, to pass over the coolers, and through the process of fermenting and lagering, and even up to the very moment that it is served as a refreshing and revivifying beverage, no effort is spared to protect it from infection. See BREWING and MALTING.

Physiology and theoretical chemistry have also exerted their influence to bring about the present wonderful development in the science of brewing. During the past few decades the most complicated processes in the malting of barley, in mashing and in fermentation have been so thoroughly explored that the knowledge derived from these researches has created a magnificent foundation upon which the malster and the brewer have been able to build more solidly than ever before in the history

of the craft. In this connection, moreover, reference must be made to an invention which has effected more radical changes in the brewing industry than almost any one single factor, for without it many of the innovations and improvements which are regarded as of such vital importance to-day could never have been made. This invention is the ice machine, without which artificial refrigeration upon any extraordinarily extensive scale, such as exist in many of the big brewing plants at this time, would have been entirely impracticable. It was since 1870 that the imperfect ice-making machine which was shown by the French inventor, Carre, was regarded as so great a curiosity that persons who were interested in such things traveled long distances to inspect it. To-day, however, conditions have changed so materially that it is only the very insignificant brewing establishments that are not equipped with model ice machines.

One of the distinctly American innovations which have tended so greatly to improve the science of brewing during the past few decades is the new method of collecting and utilizing in its purity all the carbonic-acid gas formed during the process of fermentation. By the discovery of this purely American method it has been possible to abandon the old-fashioned "kraeusen" process of carbonating, which was formerly the only method in general use. In other words, the finished product of the brewery may now be charged with the best and purest natural carbonic-acid gas that it is possible to obtain, and as this method of collecting this by-product of fermentation produces such a superabundance of the carbonic-acid gas that it may readily be liquefied, there is no reason why every other product of that kind should not eventually be crowded out of the market.

As this is not the only occasion upon which the American ingenuity has solved problems relating to the science of brewing over which some of the greatest European authorities have experimented vainly for many years, it is not strange that the brewers of the United States should be able to produce some of the best, and, at the same time, some of the most durable beer in the world. Not only have the latest and most scientific methods in brewing that can be credited to the European investigators been in use in the country, almost from the very moment of their discovery, but several of the processes which have actually originated in this country have since been accepted by foreign scientists as the most rational methods known. In 1893, Prof. Delbrueck of Berlin, and Prof. Schwackhoefer of Vienna, were sent to America by their respective governments to make a detailed inquiry into American brewing methods. Naturally every facility was offered them, and in their special report, they gave the brewers of the United States much of the credit which they deserve for having developed the primitive craft to such a high standard of perfection.

JOHN A. MANZ,
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BREWSTER—BRIALMONT

Brewster, Benjamin Harris, American lawyer: b. Salem County, N. J., 13 Oct. 1816; d. Philadelphia, 4 April 1888. He graduated at Princeton in 1834, was admitted to the Philadelphia bar (1838), and for nearly half a century practised with ardor and success the profession he loved. In 1846 he was one of a commission to adjudicate the claims of the Cherokee Indians against the United States; in 1867 he became attorney-general of Pennsylvania, and in December 1881 President Arthur made him attorney-general of the United States. Shortly after the death of President Garfield, Attorney-General Wayne MacVeagh retained Brewster to assist in the prosecution of the "Star Route" conspirators. In boyhood he was severely injured by burns received while bravely attempting to rescue his sister from a fire into which she had fallen. He was an impressive orator, and possessed scholarly attainments of a high order. Both Princeton and Dickinson colleges conferred the degree of LL.D. upon him.

Brewster, Chauncey Bunce, American bishop: b. Windham, Conn., 5 Sept. 1848. He is a direct descendant of Elder Brewster of Plymouth Colony fame. He graduated at Yale in 1868, Berkeley Divinity School, 1872, and was ordained priest, 1873. He was rector of Christ Church, Rye, N. Y., 1873-81; Christ Church, Detroit, 1881-5; Grace Church, Baltimore, 1885-8; Grace Church, Brooklyn, N. Y., 1888-97. On 8 June 1897 he was elected coadjutor-bishop of Connecticut, and consecrated in New Haven, 28 Oct. 1897. Upon the death of Bishop Williams, in 1899, Bishop Brewster became diocesan of Connecticut. Beside sermons and pastoral charges, he has written 'The Key of Life' (1885); 'Good Friday Addresses' (1894); 'Aspects of Revelation' (1901), being the Baldwin lectures before the University of Michigan. Yale and Trinity colleges, have conferred the degree of D.D. upon him.

Brewster, Sir David, Scottish natural philosopher: b. Jedburgh, 11 Dec. 1781; d. Allerly, near Melrose, 10 Feb. 1868. He entered the University of Edinburgh, where the lectures of Robison and Playfair attracted him to scientific pursuits. His first investigations were on the subject of the polarization of light, upon which he communicated some important observations to the 'Transactions of the Royal Society of Edinburgh.' In 1808 he became editor of the Edinburgh 'Encyclopedia,' to which he contributed a number of valuable articles. In 1816, while repeating the experiments of Biot on the action of fluids on light, he made those observations which resulted in the invention of the kaleidoscope. In 1819, in conjunction with Jameson, he founded the Edinburgh 'Philosophical Journal,' of which he was sole editor (1824-32). Brewster was one of the founders of the British Association, whose first meeting was held at York in 1831, and he presided over it on the occasion of its 20th meeting, held at Edinburgh in 1850. In 1832 he received the honor of knighthood along with a pension from the government. Both before and after this time his services to science obtained from many quarters the most honorable recognition. The French Institute, of which he had been a corresponding member since 1825, appointed him one of its eight foreign associates, 4 Jan. 1849,

and he was also among the members of the academies of St. Petersburg, Berlin, Vienna, Stockholm, and Copenhagen. From Prussia he received the Order of Merit in 1847, and in 1855 the cross of an officer of the Legion of Honor was bestowed on him by Napoleon III. From 1838 to 1859 he was principal of the united colleges of St. Leonard's and St. Salvador at St. Andrews, and in the latter year he was unanimously chosen principal of the University of Edinburgh—an office which he continued to hold till his death. His chief works are: 'Treatise on the Kaleidoscope'; 'Letters and Life of Euler'; 'Letters on Natural Magic'; 'Treatise on Optics'; 'Martyrs of Science'; 'More Worlds than One'; 'Memoirs of the Life, Writings, and Discoveries of Sir Isaac Newton' (1855); besides numerous communications to the Royal Societies of London and Edinburgh, contributions to the 'Encyclopedia Britannica,' the Edinburgh and North British 'Reviews,' and other periodicals.

Brewster, Frederick Carroll, American lawyer: b. Philadelphia, Pa., 15 May 1825; d. Charlotte, N. C., 30 Dec. 1898. He graduated at the University of Pennsylvania, read law with his father, and was admitted to the Philadelphia bar, 1844, of which he became a leader and one of its brightest ornaments. He was elected city solicitor (1862); judge of the court of common pleas (1866-9); attorney-general of the State (1869-70). He was successful as counsel in the famous Stephen Girard will case, and secured the decision in the Chestnut Street bridge case, wherein a decree was entered in the United States supreme court allowing the city of Philadelphia to cross the Schuylkill River by bridge. He published 'Reports of Equity, Election, and other Cases in the Courts of the County of Philadelphia' (1869); 'Digest of Pennsylvania Supreme Court Cases' (1869); 'Brewster's Blackstone, with Annotations of Decisions on the Rule in Shelly's Case' (1887); 'A Treatise on Practise in the Pennsylvania Courts' (1887-8).

Brewster, William, elder of the Plymouth pilgrims: b. Scrooby, England, 1560; d. Plymouth, Mass., 16 April 1644. He was educated at Cambridge, and entered the service of William Davison, ambassador in Holland, but presently retired to Scrooby manor house in Nottinghamshire, where his attention was chiefly occupied by the interests of religion. He was one of the company who with William Bradford attempted to find an escape to Holland, and were thrown into prison at Boston. Having obtained his liberty, he first assisted the poor of the society in their embarkation, and then followed them to Holland. Here he opened a school at Leyden, for instruction in English, and also set up a printing press. He was chosen a ruling elder in the Church at Leyden, and came to New England in 1620 with the first company of the Pilgrims. Until 1629 the principal care of the Church at Plymouth devolved upon him, though, as he was not a regular minister, he could never be persuaded to administer the sacraments. See Steele, 'Chief of the Pilgrims'; 'Life of William Brewster' (1857).

Brewster's Law. See LIGHT.

Brialmont, Henri Alexis, ôñ-rē ā-lēk-sē brē-al-môn, Belgian military writer: b. Venló, 25 May 1821. He entered the army in 1843 as

lieutenant of engineers, and in 1877 became lieutenant-general. Among his works are 'Considérations Politiques et Militaires sur la Belgique' (1851-2); 'Précis d'Art Militaire' (1850); 'Histoire du Duc de Wellington' (1856), translated into English by Gleig; 'Etudes sur la Défense des Etats et sur la Fortification' (1863); and many works on fortification. He has fortified Namur, Bucharest, Liège, and other places.

Bri'an (surnamed БОРОИМНÉ or BORU): b. 926; d. 23 April 1014. He figures in early Irish annals as a celebrated chieftain, and son of Kennedy, king of Munster. He succeeded to both Munsters, nearly identical with counties Tipperary and Clare, in 978. Having defeated the Danes of Limerick and Waterford, he turned his arms against O'Maclachaglin, or Malachi, who had a nominal supremacy over the whole island, and became king in his stead, levying tribute, or boroiimbé, from which circumstance he derived his surname from the rulers of all the different provinces. He distinguished himself as much in peace as in war, contributed greatly to the progress of civilization, and made many internal improvements. He fell at Clontarf, after gaining a signal victory over the Danes, who had leagued with a revolted chief called Maelmora.

Briançon, Charles Julien, shārl zhū-lē-ān brē-ān-shōn, French mathematician: b. Sèvres, 1785; d. 1865. Besides some important papers contributed to French mathematical journals, he has left small treatises on lines of the second order (1817), and the application of the theory of transversals (1818). He is best known by a theorem, the correlative of Pascal's which he published in 1806. The theorem is: If a hexagon is circumscribed to a conic, the straight lines joining the three pairs of opposite vertices are concurrent.

Briançon, brē-ān-sōn, a town in France, in the department of Hautes-Alpes, on the right bank of the Durance, 35 miles northeast from Gap, and near the Italian frontier. It is a fortress of the first class, occupying an eminence at the foot of the Col de Genève, 4,284 feet above the level of the sea, and has sometimes been called the Gibraltar of the Alps, forming, as it does, a central point from which troops can be marched to all their most important passes. Briançon is a town of great antiquity. According to Pliny it was founded by the Greeks.

Briansk, bryānsk, a town in Russia, in the government of, and 70 miles west-northwest from Orel, on the right bank of the Desna. It is surrounded with an earthen rampart, contains 16 churches, a monastery, with a seminary, and two poorhouses. It has a considerable trade in grain, hemp, hemp-oil (sent to St. Petersburg and Riga), honey, and wax; and in linen, cables, and cordage, ironware, bark, mats, lime, and tar, which are sent to Kherson, Odessa, and other parts of the Black Sea. It contains imperial building-yards, for which the oak forests in the neighborhood supply material. Near it are a cannon-foundry and a manufactory of small arms.

Briare, brē-ār, a town of France, in the department of Loiret, on the Loire, 25 miles south of Montargis. The canal, to which the

town is indebted for its importance, is the oldest work of the kind in France, having been begun in the reign of Henry IV., though it was not finished till 1740. It establishes, by means of its junction with the canal of Loing at Montargis, a communication between the Loire and the Seine, and conveys the various products of the province, watered by the former, to Paris.

Briareus, bri-ā-rē-ūs (also called ÆGÆON), a giant with 100 arms and 50 heads, the son of Uranus and Gæa. His two brothers, Cottus and Gyes, were formed in a similar manner, and their formidable appearance struck their father with such terror that he imprisoned them at their birth in the bowels of the earth. In the war with the Titans Jupiter (Zeus) set them free, and by their assistance gained the victory. When Juno, Neptune, and Minerva conspired to bind the sovereign of the gods, Thetis brought Briareus from the depths of the sea (how he came there is not known) to the relief of the trembling Jove. Virgil places Briareus in the vestibule of hell. He was employed with his hundred-handed brothers in watching the Titans in Tartarus. Various other fables are told of these gods, who are supposed to be personifications of the extraordinary phenomena of nature manifested in volcanoes, earthquakes, and other commotions.

Bribe, a reward given to a public officer or functionary, to induce him to violate his official duty for the benefit or in compliance with the wishes of the party by whom or on whose behalf the bribe is given or promised. Bribery, at common law, is the receiving or offering any undue reward by or to any person whomsoever, whose ordinary profession or business relates to the administration of public justice in order to influence his behavior in office and to incline him to act contrary to his duty and the known rules of honesty and integrity. Certain writers limit bribery at common law to persons concerned in the administration of justice. The offense is much broader than this according to the weight of authority. It is said by Bishop to be the voluntary receiving or giving of any thing of value in payment for an official act done or to be done, and that it is not confined to judicial officers or other persons concerned in the administration of justice, but that it extends to all officers connected with the administration of the government, executive, legislative, and judicial, and under the appropriate circumstances, military. In nearly all of the States of the American Union, however, the offense is now defined by statute, so that a resort to common law is not often necessary, except for general principles. Bribery may be committed with respect to officers *de facto* as well as officers *de jure*. The offense of the giver and of the receiver of the bribe has the same name. For the sake of distinction, that of the former—that is, the briber—might be called active bribery; while that of the latter—that is, the person bribed—might be called passive bribery. The thing offered or accepted need not be money, but may be property, services or anything else of value. It must be of some value, but as the essence of the offense is its tendency to prevent justice in any of the departments of government, executive, legislative, or judicial, the degree of value of the bribe is not essential. It has been held, however, in Indiana, under a statute prohibiting the giving or receiv-

ing anything of value, that an officer who received a note could not be convicted, because the note, not being enforceable, was of no value.

At common law and under the statutes, in order to constitute bribery there must be a corrupt intent to influence the officer or other person, or on his part, to be influenced, in the discharge of his official duties. It is not essential, however, unless specially required by a statute, that the act induced, or sought to be induced, shall favor, aid, or benefit the person giving the bribe himself. The act which is induced or sought to be induced by the bribe must be an act in discharge of a legal duty. It is not bribery if the act is in discharge of a mere moral duty. Bribery is regarded in the United States as being of such a serious nature that it is made a felony in nearly all of the States, and the punishment for the various species of bribery may be, in New York, and many other States, imprisonment for a period not exceeding 10 years. "Bribery at common law, in a judge in relation to a cause pending before him, was regarded as an offense of so grave a nature that it was sometimes punished as high treason before the 25 Edw. III., and at this day is certainly a very high offense, and punishable not only with forfeiture of the offender's office of justice, but also with fine and imprisonment," etc. Bribery in England is punished in inferior officers with fine and imprisonment, but in judges, especially the superior ones, it has always been looked upon as a heinous offense. In the United States in many jurisdictions bribery at elections, either effected or attempted, is a disqualification for office, and an election procured by bribery is void. An attempt to bribe, though unsuccessful, has been held to be criminal, and is punished in many States as severely as the substantive offense. The reason for the law is plain. The offer is a great temptation to the weak or the depraved. It tends to corrupt, and as the law abhors the least tendency to corruption, it punishes the act which is calculated to debase, and which may affect, viciously, the morals of the community.

Brice, Arthur John Montefiore, English barrister and traveler: b. 27 June 1850. He founded and for some time edited the 'Educational Review,' and has traveled extensively in Europe, Asia, the Arctic regions, and North and South America. He has published 'Stanley, the African Explorer' (1888); 'Florida and the English' (1888); 'David Livingstone' (1889); 'Leaders into Unknown Lands' (1891); 'Geographical Methods' (1895); 'The Great Frozen Land' (edited 1895).

Brice, Calvin Stewart, American capitalist: b. Denmark, Ohio, 17 Sept. 1845; d. New York, 15 Dec. 1898. He practised law in Cincinnati from 1866 to 1880, when he became interested in railroad and various other financial undertakings. He was presidential elector on the Tilden ticket in 1876 and the Cleveland ticket in 1884 and chairman of the Democratic National Committee in 1888. In 1890 he was elected United States Senator from Ohio, and served on the Appropriations, Pensions, Pacific Railroad, and Public Buildings and Grounds committees. Shortly before his death he formed a syndicate which secured vast railroad and mining concessions in China.

Brice, Saint, French prelate: b. Tours; d. there, 13 Nov. 444. He is commemorated on 13 November. On the death of Saint Martin he was made Bishop of Tours. St. Brice's Day, 1002, is memorable in old English history for a great massacre of the Danes. It was believed that it was a concerted attempt to exterminate all the Danes in England; but, failing of its bloody purpose, it led to reprisals by the Danish King Sweyn.

Brick, Jefferson, a figure in Dickens' 'Martin Chuzzlewit,' intended as a caricature of an American journalist of 60 years ago.

Brick, a rectangular mass of clay, dried in the sun or baked in a kiln, and used for building purposes. To mold wet clay into cubes for the erection of walls and houses was one of the first efforts of man at architecture. There still exist in perfect preservation sun-dried bricks made by the Babylonians and Egyptians over 4,000 years ago. On some of these are valuable inscriptions relating to the cause of their making, family history, etc. In many cases straw was mingled with the clay in order to give it greater coherence. The story of the Egyptian taskmasters and the brick-making Israelites told in Exodus i 14; v. 4-19, is too well known for further reference here. Scarcely less ancient than these Babylonian and Egyptian bricks are the "adobe" bricks of Yucatan and Mexico. There still exist in Colorado, Arizona, New Mexico, Texas, and California hundreds of these "dobe" houses, some of them more than 300 years old and still inhabited. The Aztecs and other American aborigines were adepts at using this material, and constructed wonderful architecture out of it. The present Indian town of Laguna, in New Mexico, illustrates the decadence of this art, which the Spanish found so perfect in Old Mexico.

The modern methods of building-construction in America, by which towering skeletons of steel are used as a framework, compel the use of vast quantities of brick as "filler." Not even the manufacturers can give an accurate estimate of the number of bricks made in the United States annually, but a conservative figure would be 25,000,000,000. Of this enormous output about \$1,000,000 worth is exported. At Peterborough, England, 800,000,000 brick are made annually.

Varieties.—There are about 100 different varieties of brick now made in the United States, so marvelously has this industry grown of late. One can now order bricks of almost any conceivable size, shape, or hardness. The material varies. Common brick for rough wall work and filling comes from the soft sand clays along the Hudson and in New England, Kansas, and the Far West. Fine face-brick for the fronts of buildings is usually made from the better clays of Staten Island, New Jersey, and Pennsylvania. Powerful machinery now grinds up shale, fire-clay, quartz, spar, calcine, lime, ochre, and like hard materials to form the imperishable fire-brick and vitrified brick. The former is used between the beams and joists of the modern "skyscraper," to make the building impervious to fire, as this brick has been already so heated that further heat, even in a mighty conflagration, affects it little. Vitrified brick is used mostly for street pavements; some cities, like

New Haven, Conn., being paved almost entirely with it. This material wears for years, and is probably the most economical paving known. Terra-cotta tiling and pipe for drains are also included as part of their output by many brick manufacturers, as well as the beautiful colored and glazed bricks used for mantels and ornamental work. Probably 80 per cent of all the brick made is the rough and semi-rough for wall work. Some of the largest American cities have stringent fire laws which compel all buildings in the corporate limits to be built of brick, stone, or iron. Denver, Col., and other western cities are in this class, a majority of their houses being of brick.

Manufacture.—Scattered over almost every part of the United States and Canada are brick-yards. There are about 12,000 manufacturers of brick in the United States, 8,000 of whom are large concerns using more or less machinery. Some of these latter have yards in which 10 machines are working, each machine capable of turning out 100,000 finished bricks per day. This means 1,000,000 bricks a day for one yard. As the average period of work per year is eight months, such a yard can (and usually does) produce 200,000,000 bricks each season. Scarcely any of the larger firms but has at least one of these machines. One enormous plant just established at Dover Point, Mass., covers a vast area, and has huge traveling cranes which move 20-ton loads of brick with gentleness and precision. Electric lights and power thus enable a few men to do the work of a hundred by the old methods.

Brick-clay consists largely of hydrated silicate of alumina, with iron in varying quantities, and sand, or free silica. It varies greatly in adhesiveness, hardness, and value. The hand method of working the clay into brick is still used by about 4,000 small yards in the United States. By it one or two men can mold and kiln about 50,000 rough bricks in a season, though under favorable conditions they may make considerably more. The clay is usually dug in the autumn and allowed to freeze and thaw until spring, thus disintegrating the mass thoroughly through the action of frost. It is then either spaded until all lumps are removed, or put into a horse-power pug-mill, where it is ground up more thoroughly. The mold is simply a box, open at both ends, the size of the brick desired. The protruding clay is planed off with a straight-edge, and the cube of wet clay is then allowed to dry in sheds for some hours before it is placed in a kiln for firing. This latter process usually takes from 10 to 15 days, and must be carefully attended to, so that the brick shall not become cooled until the operation is finished. After cooling, stacking, and counting, they are ready for the market.

Of the 8,000 concerns in the United States who may properly be termed manufacturers, about 50 per cent use what is known as the "stiff plastic" process of making brick, which is now recognized as the best and most economical of all. It saves from 20 per cent to 40 per cent in labor and makes a perfectly homogeneous brick. If the material to be worked is of a hard or flinty nature (shale), it is first ground in a "dry-pan," after which it is raised by means of a cup elevator and passed through a screen to the pug-mill, or mixer, the tailings from the screens being returned to the dry-pan. If the material is sufficiently open, as

good brick-clay should be, it can be run direct to the pug-mill with little disintegration or grinding. The pug-mill is usually 10 or 12 feet long and contains a series of mixing knives, by which the clay and water are mixed to a proper consistency. From this mixer the clay passes into the brick machine, where it is compressed by a heavy auger into a solid and continuous column, being forced on to the cutting-table through a die of proper size to form the length and width of the brick. The cutting is done by fine steel piano-wires on a revolving wheel, working automatically. One of these machines is capable of turning out an average of 100,000 bricks per day. A belt traveling a little faster than the column is moving, separates the severed cubes and carries them to the re-press. This latter squares their corners and edges, gives them a smooth, polished surface, and imprints upon them any lettering or design desired. The cubes are not put through the re-press unless intended for front- or face-brick. The common, rough brick go immediately from the cutting-table to the dryer, which consists of a series of tunnels built of brick 4 feet wide and 5 feet high by 120 feet long. These tunnels are heated by a furnace underneath, by steam pipes, or (in large plants) by a blower which conveys the waste heat from the cooling kiln. The cubes are loaded on little cars and run into these tunnels, where they remain till drawn out at the end of 24 hours thoroughly dried. Each tunnel holds about 5,000 bricks. The bricks are then ready for the kilns, which are of various designs. The down-draft is a favorite modern method of construction. This requires small structures, round, 10 or 12 feet high and 30 feet in diameter, held in place by heavy iron bands to prevent warping from the intense heat. The floors are made of perforated blocks. Superheated air from the furnaces is forced from the top down through the brick piled within, through the floor, and either out through a chimney or into other kilns or dryers. The interior of these kilns under fire is a solid sheet of twisting flame and heat, turning the brick a cherry red, if of common clay, and white, if of harder material. This is kept up for from six to ten days, when the fires are drawn and the mass allowed to cool. The continuous kiln of from 16 to 22 chambers has been tried considerably of late, and has produced some exceptionally economical results. This stiff plastic method enables the handling of the clay-cubes as they leave the cutter without preliminary drying. This and its simplicity make it very popular, and it is rapidly superseding all other methods. The machine is being made for export to Spain and other countries, and is in use in most of the larger yards in America.

About 40 per cent of the 8,000 manufacturers mentioned above are compelled by the nature of their material to use the "soft-mud process." Clays of a short, sandy nature, or those with a disposition to excessive lamination, are readily treated by this system, and beautiful sand-faced brick results. As a rule the Hudson River yards have to use this system, as well as many in New England and the Middle West. The clay passes first through the separator to free it of lumps, whence it is elevated to the pug-mill compartment of the brick machine. In the pug-chamber it is thoroughly mixed, and water added to make it of the proper consistency to

BRICK-LAYING—BRICK-MAKING MACHINERY

mold easily. The machine presses it into wooden molds, which are sanded inside to prevent adhesion of the clay to the mold, and are removed automatically. They are then placed on a revolving dumping-table, where they are dumped on to pallets, the empty mold being again sanded and passed to the machine for use again. Then the brick goes to the dryer and afterward to the kiln. It takes much longer to make brick by this mold method, but a very fine brick is produced, with a perfectly homogeneous body to it.

Not more than 10 per cent of the manufacturers can or do use the expensive "dry press" method, which takes the finer clays and presses them with a force of 20,000 pounds to the square inch into steel molds. The clay is nearly dry when this is done, so that the cakes can be handled with ease at once. The objection urged by some against this method is that the brick resulting is too porous and apt to absorb moisture, and "sweat" or disintegrate. Still, for the finer clays this method possesses advantages which will cause it to be used for a long time, and it may never be abandoned. The beautiful clays of Staten Island and in portions of New Jersey and Pennsylvania are nearly white, very fine, and smooth in texture. These work up into most artistic front- or face-brick for the exterior of fine buildings, or for decorative mantel and chimney work in the interiors. It is the most costly brick known to the trade. The machinery used in this process is simple, consisting of presses, dies, and molds. It naturally requires less time to dry and kiln these bricks, but the process is not a rapid one.

Fire-brick, paving-brick, fire-proof lathing, and other forms of excessively hard brick are made from shale, quartz, and difficult material generally. This has to be ground up by ponderous dry-pans before it can be cast into shape. The mold system is of necessity most used in making this class of goods, though some excellent work is turned out by the stiff plastic method above described. The lathing contains a proportion of sawdust to enable nails to be driven into it. In this category should come the terra-cotta brick for roofing, etc. Enormous quantities of fire-proof brick are now being made for the huge new buildings of our modern cities. Its manufacture is a distinct trade in itself. Modern American-made brick, of whatever design or quality, is 10 times harder and more durable than that of most other countries, though produced at a fraction of the cost. But for the great weight of brick our exports would be enormous. Each year American ingenuity perfects additional machinery enabling better and cheaper brick to be made. The brick of to-day will outwear five of those made even 10 years ago, as a rule. For further information regarding the uses of brick, see BUILDING MATERIALS; BRICK-MAKING MACHINERY; CLAY-WORKING MACHINERY; etc.

Brick-laying and Brick-work. See MASONRY AND BUILDING.

Brick-making Machinery, machines and structures employed to prepare, mold, and dry, plastic clay into rectangular blocks of various sizes which, after being hardened by baking in ovens or kilns, are commercially known as bricks, and are extensively used for building purposes.

For information relative to the sizes, composition, qualities, and various uses of bricks, and the general history of brick-manufacture, see BRICK.

The different types of brick-making machines are exceedingly numerous, but they may be conveniently divided into three classes: soft-clay molding machines, die-working machines, and dry-clay working machines. In the soft-clay molding machines, which are also known as sand-molding machines, clay taken directly from the bank is mixed with water and tempered in the machine, and then pressed into sanded molds which are fed in automatically beneath the press-box. The molds thus filled under pressure are then moved forward to a delivery table, where they are emptied and then returned for refilling. This process makes bricks of a fine homogeneous quality, but is slow, and the machines are as a rule used by the smaller manufacturers.

Die-working machines are of two types: those in which the clay is moved out continuously by means of a rotating auger, and those in which the clay is pressed out in bars of specific lengths by the reciprocating motion of a plunger.

These machines are employed in what is commonly known as the stiff-tempered process of brick-making, the product of which is, perhaps, that most generally approved by brickmakers, builders, engineers, and architects. In both types, the bar of clay is cut up into bricks of the desired size by wires which, according to the mechanical contrivances adopted to operate them, give to these machines the additional designations—end-cut and side-cut.

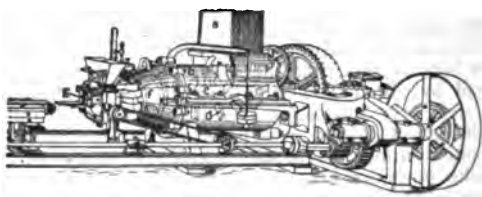


FIG. 1.—Auger Brick Machine.

Fig. 1 shows a modern auger machine. It consists essentially of a hopper (a) entering the tempering case (b) which contains the tempering shaft (c) carrying the tempering knives (d) on its side, and the expressing screw (f) on its end opposite to the forming die (g). The hopper is square, but larger at the bottom than at the top, in order to prevent jamming, and being provided with rounded corners, prevents the clay from sticking in them. It opens into the tempering case at one side of its centre line, so that the clay fed into the machine is forced into contact with the revolving tempering knives on the upward part of their motion. This tends to agitate the clay in the hopper, thus preventing clogging and an irregular supply of clay to the tempering device. Additional clogging of clay in the hopper is obviated by the use of an irregular faced cast-iron roller situated at the bottom of the hopper immediately above the line of tempering knives, and on the side towards which the knives revolve. The tempering knives force the clay against the roller to which it adheres, thus enabling them to cut through the solid mass of fine clay and lumps, but, as this roller revolves about once every minute, the adhering clay is brought within the path of the

BRICK-MAKING MACHINERY

knives which carries it off and tempers it, and also effectually cleans the throat of the hopper of the most sticky and tenacious clays.

The tempering part of the machine consists of a strong cast-iron, cone-shaped case within which the tempering device revolves. This device consists of a horizontal shaft into which are set radially and spirally, strong tempering knives of wrought-iron or steel. The revolution of the shaft forces the knives through the clay, which being free from much water, and therefore quite stiff, does not slip before the knives, but is cut by them through and through and thus thoroughly tempered, the air escaping back through the untempered clay. The spiral position of the knives also forces the clay forwards so that by the time it reaches the smaller end of the tempering case it is ready to be formed into bricks.

At this point the clay is taken up by the expressing screw, and is slid forward within the steam-heated screw-case and delivered as a solid round column to the forming-die from which it issues in the form of a continuous bar of clay of the required dimensions.

Since, in accordance with the laws governing the movement of fluids under pressure, the clay as it moves through the die is retarded by friction at the corners, and moves more freely at the centre, a peculiar shaped "former" is employed to facilitate the flow of the clay to the corners, and retard it opposite to the long sides of the die, thus re-enforcing the angles of the bar of clay and ensuring square and well defined corners to the bricks. This former is secured to the screw-case by a hinge and swinging-bolt which enables it to be quickly opened for the removal of stones, and like the screw-case,

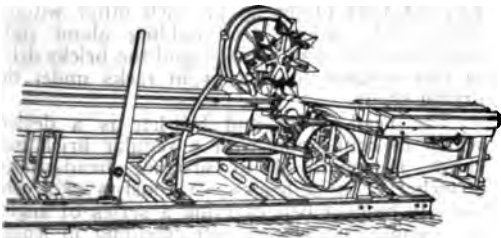


FIG. 2.—Automatic Wire Cutter for End-cut Bricks.

being heated by steam, facilitates the sliding and the forming of the clay. As the bar of clay emerges from the forming-die, it passes through a small chamber called the "sander," filled with fine dry sand which adheres to the surface of the bar, and renders the bricks when green, much nicer to handle and prevents them from sticking together on the barrows, in the hacking, or on the drying cars, and improves their color when burnt.

Of the various devices employed to cut the clay bar thus formed, into bricks, the automatic end-cut wire cutter is probably the best. (See Fig. 2.) It consists of a regulating frame or table on to which the bar of clay is carried from the sander and by which the cut-off is controlled. The belt carrying the bar of clay runs around a measuring wheel which determines the exact lengths to be cut according to the desired size of bricks. The cut-off wires are strained on

steel bows or springs to a tension, which while sufficient to cut, yet yields readily to obstructions such as stones, either cutting around them, or springing over them and operate hour in and hour out automatically and without any trouble. A broken wire may be replaced at once without stopping the machine. The wires are carried by their springs on a sprocket-wheel over and through the bar of clay, and are guided so as to make a square cut, by a cam encased in an oil-tight case. The partly severed brick is supported and held against the unsevered bar until completely cut off, when it is dropped on to the off-bearing belt which immediately carries it off, the cutting wire returning above the bar between the brick and the uncut end of the bar.

Off-bearing belts are of the endless type and may be arranged to carry the bricks cut off from the continuous clay bar, to distances as great as two hundred feet across the yard, from which they may be wheeled to convenient points for hacking (the stacking up of green bricks on platform cars for artificial drying), or loaded directly upon the dryer cars as may be required.

An auger end-cut machine of this type is capable of an average daily product of 75,000 bricks. Its weight complete is about 20,000 pounds, and it is equipped with a friction-clutch driving-pulley 48 inches diameter, by 12 inches face. Its length from outer edge of driving-pulley to end of 16-foot length off-bearing frame is about 52 feet, and the rear end of the machine occupies a floor space of 8 feet. (See Fig. 2.)

Of side-cut devices, the rotary cutter is perhaps the most simple in construction, and the most reliable in operation. Its action is entirely automatic and extremely sensitive to regulation. It produces bricks of uniform thickness and smooth angles. Being independent of reciprocating action, the cutter may be run at any desired speed, and as the wires always move downwards and forwards, making an angle with the top surface and outer edge of the bar, all obstructions are pushed from the surface into the body of the bar, thus preventing the ruffled edges common to many side-cut bricks.

In the machine shown in Fig. 3, the pair of bevel gears (a) are encased in a dirt tight case when the machine is in operation. These gears together with the measuring wheel situated immediately under the bar of clay, forms the con-

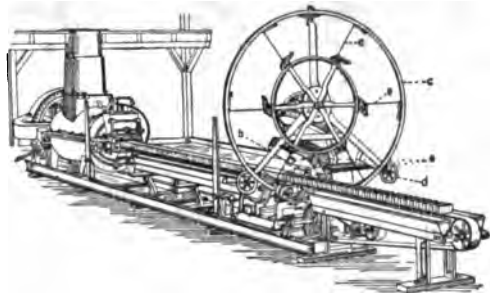


FIG. 3.—Automatic Side-cut Brick Machine.

nection between the cutting reel and the origin of motion of the moving bar of clay, and enables the revolving cutter to instantly and auto-

BRICK-MAKING MACHINERY

matically adapt itself to any changes of speed in the movement of the clay bar. The bar of clay is supported on the bottom face and at one side thus ensuring a smooth sharp cut. The slit through which the wire passes is just wide enough to accommodate the thickness of the wire used. The two vertical side-plates (b) are hinged so that they will open outward if a stone or other hard substance is pushed against them by the cutting wire, and after expelling the same return instantly to the normal position of support. The measuring wheel is of a given diameter for each thickness of brick, thus requiring a change of the wheel if a change in the size of the brick is desired. Such a change is generally accomplished in about half an hour. Recent improvements have developed cutters that enable manufacturers of paving bricks, to make "builders" and "pavers" simultaneously. For example, two bricks out of every six cut at each revolution of the cutter may be 2 inches thick, and the other four 4 inches thick, or any other combination that may be desired. The adjustable variations in thickness are by graduations of sixteenths of an inch, and the scope of the cutter runs from bricks 2 inches thick to blocks 5 inches in thickness. The large ring (c) is turned with a 2-inch V groove in its outer edge, and is supported by the two smaller wheels (d) engaging in the groove so that the weight of the larger wheel is entirely supported by them, thus relieving the cutting wires from all strains other than that due to the cutting of the bricks. The looped wires (e) are about 12 inches long, and are attached to tempered steel springs which while keeping the wires taut, yet permit a necessary amount of flexibility. A wiper, not shown in the illustration, automatically cleans the wires between each cut. The slow motion of seventeen turns per minute of the cutting reel, cuts one hundred bricks per minute, and may be operated to cut twice that number with perfect safety.

An auger machine equipped with the side-cut device of the type described has a capacity of about 50,000 bricks per day.

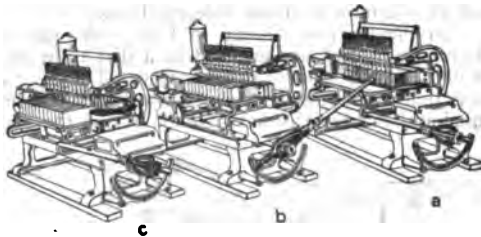


FIG. 4.— Board Delivery Cutting Table.

Of the various forms of cutting devices, the delivery cutting table may be described as a general third type. (See Fig. 4.) This table cuts 12 bricks at a time, automatically drawing a smooth board under the bricks as they are cut. The upper portion of the table travels forwards upon a track while the wires are being drawn through the bar of clay, thus compensating for its forward motion, while a slight pressure upon the lever during its return stroke brings the table to its original position and places the board loaded with bricks ready for removal.

The apparatus weighs about 900 pounds, and measures about 9 feet in length, including hand lever in operating position. Modifications of this table are employed for cutting chimney blocks and hollow ware of large section. Diagrams (a), (b), (c) of Fig. 4, illustrate in the order given, the operation of the device — (a) beginning of cut, (b) end of cut, (c) delivery of the bricks.

Automatic indenting cutters are employed to produce round edged bricks or blocks for street paving purposes. It appears to be a matter of some controversy as to whether any advantage other than the rounding of corners or edges is gained by the practice of repressing bricks for paving purposes. It is the general opinion that repressing breaks the original bond formed between the particles in molding the material into shape in the brick machine and fails to establish a new bond equally as good. The automatic indenting cutter is calculated to do away with the repress in this particular class of bricks.

To facilitate the handling of bricks in their green condition and to prepare them for the drying and burning processes, various appliances are employed which ensure more or less economy in time and labor. The brick-edger is an attachment, 5 feet 8 inches long, which may be placed on end-cut brick machines to automatically turn the bricks on edge as they are being transferred to the off-bearing belt. Such an attachment will save the labor of one man on an output of 30,000 bricks per day.

The pallet carrier is from 16 to 32 feet in length, and is employed to facilitate the transfer of the bricks from the off-bearing belt to pallets of either wood or metal. If the clay worked is somewhat soft, so that the resulting bricks will not bear piling up on each other without defacement, pallets, each holding about eight bricks on edge may be used, and the bricks dried in this position in cars or in racks under the drying sheds.

The head-sander and brusher is a device, which in connection with a regular brick machine, is employed to produce head-sanded stretcher or stock-bricks. It consists of a continually moving belt carrying a series of angle-iron supporting pieces, corresponding in length to the bricks. The operator stands at the head of the head-sander and close to the automatic cut-off, and transfers to the supporting pieces on the belt only those bricks which are free from stone or other disfigurement. The bricks thus guided and supported, are carried by the belt between two pairs of revolving circular brushes. Dry sand in a box is kept constantly against the faces of these brushes, so that when they revolve against the horizontal motion of the bricks, the sand is brushed into both heads of each brick, thus producing a stiff-tempered end-cut brick with sanded faces and heads, so that the heads burn the same color as the faces. The capacity of the machine is about twenty-five bricks per minute, and it may also be used to sand bricks that are intended for repressing.

Repressing is a process employed to produce bricks suitable for fronts of buildings, ornamental tablets and corner pieces with designs in relief, or intaglio, and other shapes of any desired design. The great many varieties of ma-

BRICKS WITHOUT STRAW—BRIDE AND BRIDEGROOM

chips used for this purpose are called presses, and are operated either by steam or hand power. The hand press shown in Fig. 5, is equipped with a very powerful lever, and has a steel-lined box with a top-plate and plunger faced with

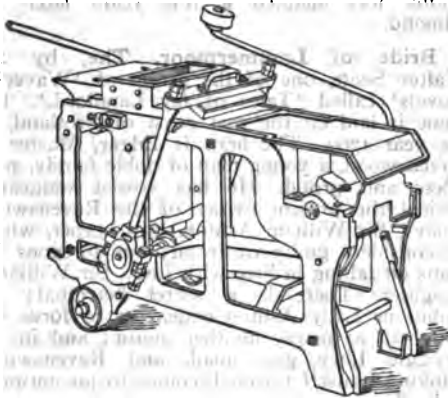


FIG. 5.—Hand-brick Repress.

steel, conveniently arranged for refitting whenever necessary. It weighs about 900 pounds; occupies floor space 20 inches by 3 feet 6 inches, exclusive of the lever, and may be readily moved upon the rollers under the forward end, from place to place about the works.

Power represses are made with one or two sets of plungers or pressure shafts, and are built with a capacity to exert pressures up to 45,000 pounds. A machine with two sets of plungers working against the mold-box, has a repressing capacity of 15,000 fine front bricks, or 20,000 street pavers per day.

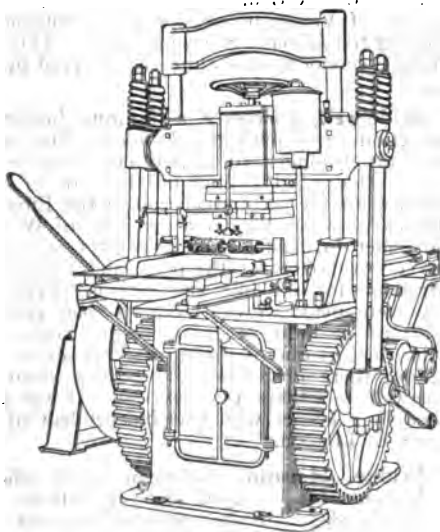


FIG. 6.—Power Repress.

Fig. 6 shows a repress in which a single plunger acts against the molding die, the pressure of the brick being taken on a solid base instead of a moving cam or plunger. It is capable of being readily adjusted to any thickness of brick, and the pressure can be regulated by the hand-wheel on the top of the plunger or

shaft. Various kinds of dies can be used, and these changed with very little loss of time. Roman, Norman, or Pompeian brick can be pressed upon it as well as the smaller sizes, also a great variety of ornamental brick, shape brick, and tiles. It has an estimated weight of about 7,000 pounds; is equipped with a friction-clutch pulley 36 inches diameter, 8-inch face, which in operation runs at the rate of about 80 revolutions per minute, and is capable of turning out about 28,000 standard size bricks per day.

The dimensions, adopted by the National Brick Manufacturers' Association in the United States, for standard hard-burnt common building brick, are $8\frac{1}{4} \times 4 \times 2\frac{1}{4}$ inches, and for a pressed front brick, $8\frac{3}{8} \times 4 \times 2\frac{3}{8}$ inches. All modern brick machines are capable of producing bricks of these sizes. See BRICK; CLAY-WORKING MACHINERY; KILNS; PIPE, MANUFACTURE OF.

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Bricks Without Straw, a novel by Albion W. Tourgée, containing a modern application of the Biblical phrase. The words are an allusion to the darkest days of the Hebrew bondage in Egypt, when the toilers were ordered to furnish their own straw without diminishing the number of bricks produced in a given time.

Bridal Wreath. See SPIREA.

Bride, Saint. See BRIDGET.

Bride and Bridegroom, words of Anglo-Saxon origin applied from very early times to a newly married wife and husband, the more common form at present being bride and groom. It has been usual from the earliest period of antiquity to pay especial honors to a bride and groom, and in every age and among every people, the wedding-day has been devoted to joyous and solemn ceremonies. It was celebrated among the Athenians by offerings made in the morning to particular divinities, to Zeus and Hera, and especially to Artemis, who was thought to look with disfavor upon marriages. At nightfall she was conducted to the bridegroom's house, in a chariot drawn by a pair of mules, and furnished with a kind of couch, on which she sat between her husband and one of his nearest friends. The bridal procession moved on, greeted and accompanied by friends bearing nuptial torches and singing songs. Then followed the marriage feast, to which, contrary to the usual Greek practice, women as well as men were invited; and at its close the bride was conducted by the bridegroom to her apartment, where a law of Solon required that they should eat a quince together. On the day after the marriage, presents were made to the newly married couple by their friends. Among the Romans the same custom prevailed, in memory of the rape of the Sabines. The wedding day was fixed, at least in early times, by consulting the auspices. The Roman marriage was usually, though not always, unattended by religious rites. The bride was conducted to the house of the bridegroom by a procession and bore in her own hands the emblems of diligence, a distaff and a spindle with wool. The bridegroom received her within with fire and water, a symbol, perhaps, of purification, and the ceremonies of the day were concluded by a repast given to friends and relatives. The bridal

BRIDE OF ABYDOS—BRIDGE

apartment, to which she was conducted by matrons who had not had more than one husband, was magnificently decked with flowers, and minstrels and friends sang without during the night.

In the days of our ancestors various ceremonies, often "more honored in the breach than the observance," were followed. The bride was undressed and put to bed by the bridesmaids, and the bridegroom submitted to the same operation, at the hands of the groomsmen. Then the posset, a drink made of milk, wine, yolks of eggs, sugar, cinnamon, and nutmeg, had to be served. Then there was sometimes another dillatory proceeding in the sewing of the bride in a sheet. The arraying of the bride in white, the wedding feast, and the giving of presents are ancient customs. As early as the time of James I., the presents received by the bride of Sir Philip Herbert amounted in value to \$12,500, a notable expenditure of the kind for those days, but frequently surpassed at the present time by the value of a single bridal gift. The bridal kiss is of unknown antiquity. The old missals, which date long before the "common prayer book," enjoined it as an essential part of the marriage ceremony. Moreover, it was always done in church. The priest, too, at one time, enjoyed the privilege of kissing the bride. Groomsmen claimed and took it for a long period. The ordinary accessories of the weddings of our days may mostly be traced to ancient times. The marriage ring probably encircled the finger of the wife of the first Pharaoh, and was certainly used in the Roman ceremonies under the emperors. Its heathen origin nearly led to its abolition by the Puritans of Cromwell's time. The wedding ring is always put and worn on the fourth finger of the left hand, because it was supposed in ancient times that an artery ran from this part directly to the heart. The bride-cake is no less sanctified by antiquity than the ring. It is a symbol of plenty, and is intended to express the hope that the newly married pair may be always supplied with an abundance of the good things of this life. In ancient days wheat was sprinkled upon the head of the bride with the same intent. At present this custom is superseded by the scattering of rice upon the bride and groom as they leave the house after the reception. The throwing of an old shoe after the couple shows traces of an old superstition. Passing bits of the cake through the wedding ring nine times, and putting them under the pillow to dream upon, was a practice in vogue long before our great-grandmothers lived and loved. Putting up the slices in white paper boxes is an innovation of later times. Wine was an invariable accompaniment of all marriages, long before the marriage feast at Cana. In times past it was customary to drink it in the church, the priest having first blessed the cup, however, to suit it to the holiness of the place. The Jews universally hold to the custom of wine-drinking on the occasion of a marriage. After the bride and groom have drunk from the glass it is broken to remind them of mortality.

Modern custom lengthens out the privileges of bride and bridegroom beyond the wedding day. In former times, when the religious ceremony and the attendant festivities were over, all bridal honors ceased. These are now prolonged by the bridal tour. The term honeymoon, formerly applied to the first month of married life, is now more vaguely used and is sometimes

given to the entire period of the bridal tour, even when that is extended over many weeks.

Bride of Abydos, The, a poem by Lord Byron, published in 1813. From this a melodrama was adapted a few years later by Dimond.

Bride of Lammermoor, The, by Sir Walter Scott, one of the group of 'Waverley Novels' called 'Tales of my Landlord.' The scene is laid on the east coast of Scotland, in the year 1700. The hero is Edgar, Master of Ravenswood, a young man of noble family, penniless and proud. He has vowed vengeance against the present owner of the Ravenswood estates, Sir William Ashton, lord keeper, whom he considers guilty of fraud; but foregoes his plans on falling in love with Lucy, Sir William's daughter. There is a secret betrothal; the ambitious Lady Ashton endeavors to force her daughter to marry another suitor; and in the struggle Lucy goes mad, and Ravenswood, thinking himself rejected, comes to an untimely end. The most famous character in the book is the amusing Caleb Balderstone, the devoted old steward of Ravenswood, who endeavors constantly to save the family honor and to conceal his master's poverty by ingenious devices and lies, and whose name has become the symbol of "the constant service of the antique world." Though sombre and depressing, the 'Bride of Lammermoor' is very popular, and the plot has been used by Donizetti in the opera 'Lucia di Lammermoor.'

Bride of Messina, The, a tragedy by Schiller, based on Sophocles' 'Œdipus Tyrannus.' It was brought out in 1803.

Bride of the Sea, a poetical name given to the city of Venice in allusion to the custom of wedding the Adriatic Sea with a ring. This picturesque ceremony was annually observed by the doges.

Bridewell, formerly a famous house of correction in Blackfriars, London. The name originally belonged to a well dedicated to St. Bride. Henry VIII. built on this site, in 1522, a palace for the accommodation of the Emperor Charles V., which became a residence of Wolsey, and under Edward VI. was, in 1553, converted into a workhouse for the poor, and a house of correction for the idle and vicious. Prisoners here were made to work during their confinement, as in most other houses of correction. From this, as one of the earliest houses of correction, there originated the generic term, "a bridewell"—a house of correction. It was governed by a keeper who was independent of the sheriff of London.

Bridge, Horatio, American naval officer: b. Augusta, Me., 8 April 1806; d. Athens, Pa., 18 March 1893. He graduated at Bowdoin College in the famous class of 1825, which included Longfellow, Hawthorne, J. S. C. Abbott, and G. B. Cheever. He was admitted to the bar in 1828, and for 10 years was in practice at Skowhegan and Augusta, Me. In 1838 he entered the United States navy as paymaster; made a cruise in the *Cyane* (1838-41); in the *Saratoga* upon the coast of Africa (1843-4), some account of which was published in 1845 under the title 'Journal of an African Cruiser,' edited by his friend, Haw-

BRIDGE

thorne. From 1854-69 he was chief of the bureau of provisions and clothing. In 1873 he was retired as pay-director with the relative rank of commodore. He wrote 'Personal Recollections of Nathaniel Hawthorne' (1893).

Bridge, Sir John Frederick, English organist and composer: b. Oldbury, Worcestershire, 5 Dec. 1844. He was organist of Trinity Church, Windsor, Manchester Cathedral, and in 1875 became full organist of Westminster Abbey. He was also made professor of harmony at Owens College, Manchester, and afterward professor of harmony and counterpoint at the Royal College of Music. Among his works are the oratorio, 'Mount Moriah'; the cantata, 'Boadicea'; the cantata, 'Callirhoe'; the oratorio, 'The Repentance of Nineveh'; etc. He has set many hymns to music, notably Gladstone's Latin version of 'Rock of Ages.'

Bridge, a game of cards. It is played with one pack of cards, and the four players are styled the dealer, the leader, the dummy, and the pone. Bridge is allied to whist, and like that game is played in more than one way. See De La Rue, 'The Laws of Bridge' (1889); Foster, 'Bridge' (1901); Dunn, 'Bridge, and How to Play It' (1901); Steele, 'Simple Rules for Bridge' (1902).

Bridge. In its broadest sense, the term signifies any kind of a connecting structure. Specifically, it defines a structure erected for the purpose of continuing a roadway over a stream, valley, or any other natural or artificial obstruction.

The origin of the term is difficult to trace, and the art of bridge-building itself is so ancient, that its beginning lies in the efforts of primitive man who felled trees, or swung jungle vines across the streams to facilitate his movements on his hunting trips, or when engaged in trade from village to village.

The construction of a bridge, however, as an engineering structure, although quite elemental in its engineering features, may be traced back more or less accurately to the Chinese who appear to have been the first people to employ the masonry arch for the purpose of continuing roadways across streams.

The art of bridge-building, however, as developed in the various countries was not evolved from the earlier Chinese practice, but independent effort characterizes its development in each country, and by the very nature of the structures built in the past, the present-day investigator is enabled to formulate very clear and accurate ideas as to the character, customs, and importance of the peoples who built them.

The Egyptians seem to have had but little use for bridges, and none have survived among the structures of their ancient civilization. Similar conditions appear to have obtained among the Babylonians and the Assyrians, and the earliest examples that remain, other than those of the Chinese, appear to belong to the "Hittite" and "Pelagic" tribes, who inhabited the shores of the Mediterranean Sea during a pre-historic period antedating that of the building of Troy. Their engineering methods appear to have been imitated by the Cretans, whose cities in Asia Minor, Greece, and Italy, and in the countries bordering on the Mediterranean, were connected

by macadamized roads which required bridges that were constructed by a high order of engineering skill. They were somewhat similar to the one built at a later period across the Euripus in Euboea, a province of Greece, and consisted of massive abutments and piers of masonry with a connecting superstructure of planks. The typical Greek method is shown by the bridge at Assos, in which parallel stone lintels doweled together are employed to connect the piers and abutments.

On the other hand, the engineering genius of the "Pelagic" tribes was inherited and developed by the Etruscans and the Romans in the application of the basic principles of the arch.

The bridges at Vulci, Bieda, and Cora, in Italy, in which true round arches are employed to connect the piers, are a class of structures which were probably unknown to the Greeks. These were built during the seventh and sixth centuries B. C., and the Roman bridge-building methods were carried through stages of greater and greater perfection until the fourth century B. C., when the Roman policy of constructing great military roads to bind their possessions together, permitted the highest development of their engineering skill, in structures of this kind.

The brilliant and unrivalled career of bridge and viaduct construction thus inaugurated by the building of the famous Via Appia, and culminating in the erection of the eight great bridges of Rome, has furnished models for all the succeeding centuries, and are applicable today to the construction of stone structures.

Some of the bridges of the Republican period still remain. Of these, the Ponto Lupo, and the viaduct for the Anio Vetus Aqueduct were built about 143 B. C., and consists of great stone arches of tufa and travertine; while the viaduct near Gabii, built about 122 B. C., consisting of seven arches about 292 feet long, is still in use. Within Rome itself, the Æmilian bridge, built in 179-142 B. C. across the Tiber, is supposed to have been the first stone bridge to span that stream, all the others having been constructed of wood, a material which continued in use until quite a late period for bridges across wide rivers. Another, the Sublician bridge built by Ancus Martius across the Tiber between the Janiculum and the Aventine Mountain was famous for its defense by Horatius Cocles against the great army under Lars Porsena. The only one of the urban bridges of Rome that remains intact, is the Fabrician Bridge, or "Ponte Fabricio," built in 62 B. C., but the greater part of the most magnificent of them all, the Ælian Bridge, or "Ponte Sant' Angelo," built by Hadrian in 136 A. D., also remains. The former consists of two round Roman arches of peperino and tufa, faced with massive blocks of travertine; the latter consist of eight arches, arranged to give an upward grade toward the center of the structure, thus adding greatly to its architectural effect.

Of the important bridges built on the great military roads of the Empire—the Appia, the Aurelia, the Flaminia, the Via Salaria or Pont Salaro, the Cassia, the Valeria, the Latina, and the Æmilia, those built during the Augustan period were the most remarkable. The Flaminia commenced at the Mulvian Bridge and ended at the Ariminum (Rimini) Bridge. The latter, which consists of five great arches with a total

BRIDGE

length of 236 feet, is the best preserved of them all; but vestiges of a great many others still remain, the most important being those near Narni and Borghetto, the great one of Vincenza, rebuilt at Verona, and those near Aosti and Calzi.

With the expansion of the Empire many bridges were built upon the fine macadamized roads which connected the various provinces with the Eternal City, by the Roman legions under the direction of their skillful military engineers. Of these, the greatest was the bridge across the Danube, built in 103 A. D., by the engineer Apollodorus, to enable the Emperor Trajan to conquer Dacia. It consisted of massive stone piers connected together by a superstructure of wood with a total length of 4,770 feet. It was subsequently destroyed by Hadrian, but the great piers are still standing.

Prior to its construction, intervals of such enormous length had been spanned by temporary bridges of boats, a practice handed down from a period reaching farther back than that of Xerxes, Darius, Hytarpus, or Cyrus—in the sixth century B. C., and illustrates effectively the consummate daring of the Roman engineer. It is interesting to note in this connection, however, that the most celebrated bridges built by the Romans were not generally distinguished for the great span of their arches, their great total length, or the peculiar lightness of their piers, but for their excellence of construction, and durability. The span of their arches seldom exceeded 70 or 80 feet, and their height was nearly half the span, thus giving them a semi-circular form, or what constituted a segment of that form.

In all the countries which formed the provinces of the Roman Empire, with the exception of the Spanish Peninsula, most of the bridges built by the Romans were allowed to fall to pieces during the Dark Ages, so that very few of them have survived. The ruins and foundations of some still exist near Vairon, and Chateau Neuf, in France, but are not of sufficient size to convey much of an idea of the special characteristics of the structures. In Spain, however, the high culture of the Moors insured the preservation of these superb examples of Roman engineering. Of these, the best examples are the bridges at Cuenca, Evora, Martorell, Merida, Chavas, Alconetar, Orense, Olloniego, Almazan, Ona, and Salamanca. The greater number of them were built by Trajan, and that of Salamanca is the most magnificent of all. Many of these structures were adorned by triumphal and memorial arches at each end, or in the center, which, while adding greatly to their architectural effectiveness, also served the purpose of a toll gate, or a fortification. Interesting examples of these are the bridges at Saint Chamas, in France, and the Ponte Salario at Rome.

The Moors not only preserved the Roman structures, but imitated them and built many bridges fully their equals in size and elaborateness of design. The bridge at Cordova, across the Guadalquivir, is one of the most notable examples of their work, and also that of Alcantara, across the Tagus, built by Lacer during the reign of Trajan. It consists of six granite arches of a total length of 600 feet, with a

width of 26 feet, which carries the roadway at a height of 45 feet above the level of the river.

The early history of Oriental bridge-building appears to extend back to the days and works of Semiramis, who is credited by Diodorus Siculus, with the construction of a bridge across the Euphrates at Babylon about 776 B. C., and is described by him as a movable drawbridge, 30 feet wide, supported by stone piers.

The earliest existing examples of Oriental work, however, appear to be the bridges at Dizfel and Shuster, in Persia, which were probably built during the rule of the later Achæminid Kings over Iran, about 350 B. C. Their design embodies the wide pointed arch characteristics of later Mohammedan architecture, and are still in a fair state of preservation.

It is noteworthy, that, while the culture and continuity of the Byzantine and Mohammedan civilizations maintained in good condition the bridges already built, and created new ones of equal usefulness and magnitude, the science and art of bridge-building was practically lost in the European countries during the six centuries which comprised the Dark Ages. In the 12th century, however, the architectural and engineering sciences felt the awakening impulses which culminated in the magnificent structural creations of the Renaissance. The revival was first experienced in Italy and France. Bridges were built not only by the governing authorities but also by the churches—the building of a bridge being considered in the nature of a pious undertaking. Bridges were built at Tours, Orleans and Vienna, and many other large cities, and the Rhone was spanned at Lyons and Avignon by two fine bridges, the last-named being about 3,000 feet in length. It was built during the years 1178-88, by Benezet, a shepherd mason, who subsequently founded an association of bridge-builders which was known as the *Frères Pontiers*, or "Brethren of the Bridge". It is remarkable on account of the elliptical curvature of the arches, the radius of which is shorter at the crown than at the haunch, and, therefore, conforms more nearly to the linear equilibrated arch, than the modern elliptical arch which has the longer radius at the crown. It consisted of 19 arches. The span of the largest arch was 110 feet 9 inches, with a height of 45 feet 10 inches. Four of the arches still remain.

The bridges built in southern France were particularly fine. The Saint Esprit, the Beziers, the Montauban and the Pont Valentré; at Cahors, are some of the best examples of those built during the period covered by the later part of the 13th and the earlier part of the 14th centuries. The application of the system of end and central towers for purposes of fortifications, received the highest development at this time. This was especially true in France where the mediæval social conditions made such fortifications an absolute necessity. In this respect, Germany and Spain were far behind France, although the monumental bridge across the Danube at Ratisbon, built by the Germans in 1135, and the bridge across the Elbe at Dresden, were very fine examples of this kind. Also, the Spanish bridges at Zomora, Tudela, Lograno, and Palencia, built during the period 1135 to 1192. These bridges are of the pointed arch

BRIDGES.



1. **MANHATTAN BRIDGE**, New York City. (Length of main span, 1,470 ft.; side spans, 725 ft.; total length, including approaches, 6,855 ft.; width, 120 ft.; height of towers above high water, 322 ft.; diameter of cables, 21 $\frac{1}{4}$ in.)
2. **WILLIAMSBURG BRIDGE**, New York City. (Length of main span, 1,600 ft.; side spans, 596 $\frac{1}{2}$ ft.; total length, including approaches, 7,279 ft.; width, 114 ft.; height of towers above high water, 335 ft.; diameter of cables, 18 $\frac{3}{4}$ in.)
3. **QUEENSBOROUGH (BLACKWELL'S ISLAND) BRIDGE**, New York City. (Two channel spans, 1,182 ft. and 984 ft.; one island span, 630 ft.; two anchor spans, 469 $\frac{1}{2}$ ft. and 459 ft.; total length, including approaches, 8,600 ft.; maximum depth of trusses, 185 ft.; width of bridge, 88 ft.)

type, some of them consisting of as many as 20 arches.

Of the Italian bridges built during this period, the best examples are the Ponte Vecchio in Florence, built in 1362, the bridge at Mantua, and the Rialto Bridge over the Grand Canal in Venice, built in 1588. These bridges were of the covered type, that is, they had a covered gallery which was flanked by a double line of booths and small shops in which all kinds of merchandise were exposed for sale. In Italy, the use of wood as a material of construction was generally adhered to until the 13th century, although in France, and in the other countries of northern Europe it had been generally supplanted by masonry. Yet, at the close of the 15th century, Italy had some fine stone structures—the bridges at Mossa and Signa in Tuscany, and the Ponte del Diavolo near Lucca; while France had many large wooden bridges at several important points.

The engineers of the Renaissance returned to the round arch typical of the Roman bridges, but they showed great boldness in their designs, by increasing the span of the arches. The bridge across the Adda at Trezzo, built under the orders of Bernabo Visconti, Duke of Milan, during the latter part of the 14th century, consisted of a single arch of granite with a span of 251 feet; while the bridge over the Ticino at Pavia, consisted of seven pointed arches of brick work, each 70 feet in span, and 64 feet in height.

Of the smaller Italian bridges, the most famous is the Bridge of Sighs at Venice, built during the latter part of the 16th century, to connect the Ducal Palace with the prison.

In England, the use of stone as a material of construction may be traced back to the middle of the 10th century, by records which authorized the building of a triangular pointed arch stone bridge at Croyland, Lincolnshire, in 943. The present structure, known as the Croyland Bridge, however, although one of the oldest stone bridges in England, appears to have been built about the latter part of the 14th century. It is also triangular in form, and consists of three pointed arches which span the waters of the Welland, the Nyne, and the Catwater drain. On account of its steep grade it can be used only by foot passengers.

The work of the "Brethren of the Bridge" order, carried the art of bridge-building up to the 17th century, and a great many fine structures were built in all parts of Europe. In France, the most important were the Trilpot, Tours, Gignac, Neuilly, and Blois Bridges, and in England, the Blackfriars, Westminster, Winston and Kelso. The date of the building of the first London bridge across the Thames is quite uncertain; but, there is very little doubt that it was built of timber and had to be frequently reconstructed. The so-called great London Bridge was built of stone, between the years 1176 and 1209, by an architect sent from France for that purpose. It had a covered gallery which was lined on both sides by shops, like a regular street. It consisted of nine pointed arches, each 60 feet in span, and had a total length of about 700 feet. It was supplanted by the structure now known as "Old London Bridge," in 1831. This structure consists of five elliptical arches, of which the center arch has a span of 152 feet, with a height of 29½

feet above high water mark. The other arches are 140 feet in span, with a height of 27½ feet. The total length of the structure is 1005 feet, and it carries a roadway 53 feet wide between the parapets. The Blackfriars Bridge across the Thames, was built between the years 1760 and 1770. It consists of nine elliptical arches. The central arch has a span of 100 feet, and the others decrease gradually from 98 feet in those next to the center, to 70 feet in those at the ends. The Westminster Bridge was built between the years 1738 and 1750. It consists of 15 arches, of which the center arch is 76 feet in span, and the span of the others decreases at the rate of four feet for each succeeding arch, except the two shore arches, each of which have a span of 25 feet. Other notable English stone bridges built during the 18th century, are the Winston Bridge over the River Tees, and the Kelso Bridge over the Tweed. The former has a superb arch 109 feet in span, while the latter consists of five arches, each of which are 72 feet in span. Perhaps the most notable stone arch bridge built in any country during the 18th century, is the Pont-y-tu-prydd, across the River Taff in Wales. It was built by William Edwards, an ordinary stone mason, in 1750, after two failures due to excessive weight of the haunches, which in the third and successful attempt were lightened by the introduction of pierced spandrels. It consists of a segmented arch 140 feet in span, with a height of 35 feet; and its most curious feature is the gradual increase of its width from 14½ feet at the crown of the arch to 16 feet at the abutments.

The most remarkable bridges constructed in France during the 18th century, were the work of the famous Department of Ponts et Chaussées. The best examples of their work are the Blois Bridge over the Loire, the construction of which was commenced in 1720, and which consists of 11 elliptical arches, ranging from about 55 feet to 86 feet in span; the bridge over the Loire at Tours, the construction of which was commenced in 1755, and which consists of 15 elliptical arches, each 80 feet in span, and separated by piers 16 feet thick; the Trilport Bridge over the Maine, built in 1760, consisting of three skew arches, the middle arch of which has a span of 81 feet, and the side arches, spans of about 77 feet; the Neuilly Bridge across the Seine, built between the years 1768 and 1774, and which consists of five elliptical arches, each 128 feet in span; and the Gignac Bridge over the Herault, built in 1793, and which consists of an elliptical center arch about 107 feet in span, flanked by two semi-circular arches, each of which have a span of 83 feet.

Although the masonry and stone arch bridges of the 19th century cannot be considered as showing much, if any, structural improvement over those of preceding times, it is a fact that the engineers of the 19th century have used their better knowledge of the theory of those structures, obtained from the progress of the science of statics, to increase the spans of the arches far beyond the limits set by the earlier practice.

Of these later productions, the largest stone arch in the world is that of the Luxemburg Bridge, completed in 1901; it is 277 feet in span;

BRIDGE

and rises to a height of about 138 feet above the level of the water. Other modern stone arches of magnitude are the Grosvenor Bridge over the River Dee at Chester, England, consisting of a single arch with a span of 200 feet, and the Cabin John Bridge near Washington, D. C., built in 1853-1859, to carry the Washington aqueduct, which consists of a single arch with a span of 220 feet.

This brief enumeration of the notable 19th century stone arch bridges may be terminated very appropriately with the mentioning of the Waterloo Bridge across the Thames. It consists of nine elliptical arches of Aberdeen granite, of 120 feet span each, with a rise of 32 feet. The total length of the structure, including the approaches, is 2456 feet, and it carries a horizontal roadway 41½ feet wide between the parapets.

About the beginning of the 19th century, metal began to be extensively introduced as a material of construction, and although the masonry arch was superior in beauty and durability, the metal bridge gave greater strength in proportion to the weight of the structure; was capable of being built more quickly and cheaply, and therefore, being better adapted to keep pace with the tremendous activity of modern railway construction, it soon almost completely supplanted the stone structures.

The first structure in which the new material was used appears to be the bridge across the Severn near the town of Ironbridge, Shropshire, England. It was built by Abraham Darby, the owner of the iron-works of Coalbrookdale, in 1779, and consists of a single arch 100 feet in span, with a rise of 45 feet. The arch is composed of five cast-iron ribs which form the segment of a circle. The successful construction of such a structure being thus clearly demonstrated, several others, of bolder design, were built during the last quarter of the 18th century, of which the Wearmouth Bridge, over the Wear at Sunderland, completed in 1796, is the most elegant example of the type. As originally constructed, it consisted of a single arch 236 feet in span, with a rise of 34 feet above the springing lines, which were 95 feet above the level of the river.

From these beginnings, the evolution of various types of metal arch structures was rapid. A larger percentage of wrought iron was employed in the material of construction, affording greater flexibility in the methods of construction and design, and the capability of spanning greater intervals with single spans. The most notable of the structures built about this time (the early part of the 19th century) was the Southwark Bridge across the Thames, erected in 1819. It consists of three arches, of which the central arch is 240 feet in span, and the side arches 270 feet each. They are composed of massive cast-iron arch ribs, which being set without any provisions to counteract the effects of expansion, and being much heavier than is necessary to sustain the loads to which they are subjected, gives a structure which is merely the imitation of one of stone, with the additional fault of a great wastefulness of the material of construction. Its construction, however, served a valuable purpose in the development of metal arch engineering. It suggested the principle of hinged arches, which was subsequently taken under consideration by the mathematicians of

Europe in 1841, and developed into a perfect theory, which made the metal arch a statically determinate structure on absolutely immovable foundations, and one that was provided against distortion and rupture under conditions of varying temperature.

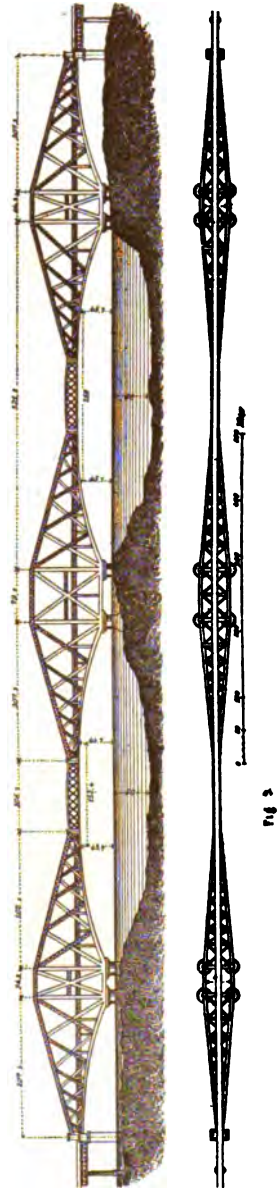
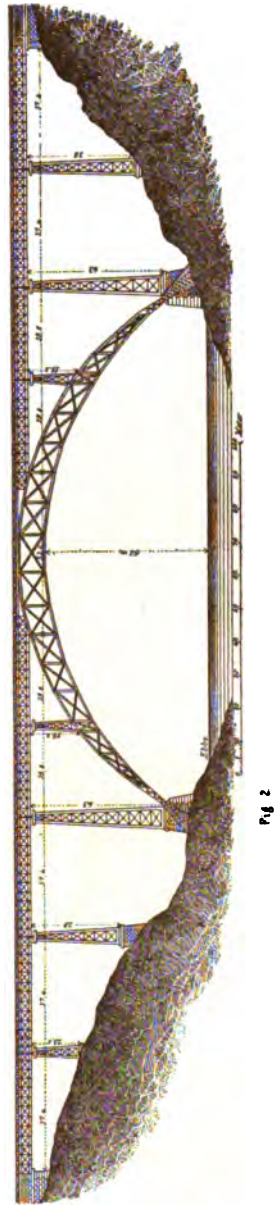
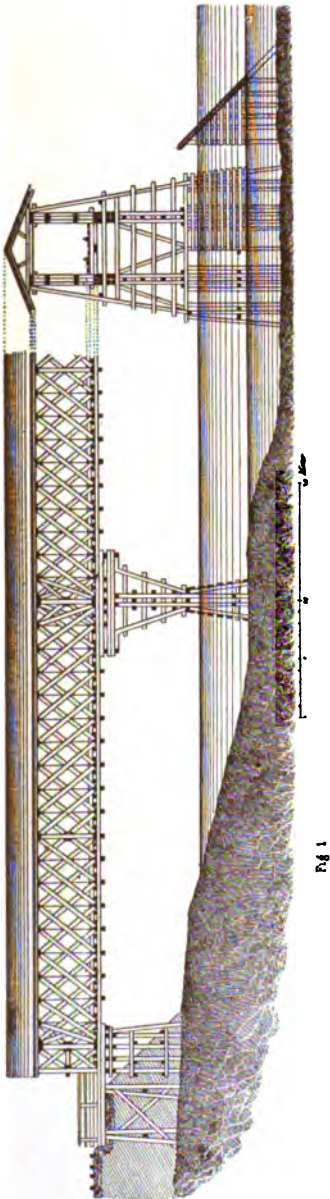
Although the fine cast-iron bridges such as the Westminster and the Blackfriars, built across the Thames during the period covered by 1860 to 1870, consisted of arches with spans as great as 185 feet, the metal hinged-arch bridges built since 1873, have surpassed them greatly, not only in the length of the spans, but in the economy of the material of construction.

An exception to this statement, however, must be noted in the case of the bridge across the Mississippi, at St. Louis, Missouri, which was completed in 1874. It consists of three unhinged structures the center arch being 520 feet in span. Of the hinged-arch bridges the following are the most notable. The Alexander III. Bridge across the Seine at Paris, built in 1899, consisting of a single arch with a span of 362½ feet, composed of arch-ribs made up of wedge-shaped cast-steel sections bolted together; the steel-arch railway bridge across the Niagara River, built in 1897, consisting of a single arch with a span of 550 feet; and the highway and foot-bridge completed in 1899 across the Niagara Gorge, just below the Falls, consisting of a single steel arch with a span of 840 feet, which makes it the largest single span steel-arch bridge in the world, and is approximated to in size only by the steel-arch of the Viar Viaduct in France, which is 762 feet in span.

Some of the other handsome and important structures of the metal hinged-arch type well worthy of mention are the following: The Washington Bridge over the Harlem River, at New York, completed in 1889, which consists of two magnificent arches, each 510 feet in span, flanked by four masonry arches at one end, and three at the other, each 50 feet in span; the German steel-arch bridges across the Rhine at Bonn and Düsseldorf, the former with a central arch of 614 feet span, and two side arches each 307 feet in span, and the latter with two arches each 995 feet in span; the Pia Mia Bridge over the Douro at Oporto, Portugal, consisting of a main steel arch, 525 feet in span with a rise of 123 feet; and the steel arch on Garabit Viaduct over the Truzere, in central France, which has a span of 540 feet with a rise of 170 feet.

As the tensile strength of wrought iron and steel was greatly increased by improved processes of manufacture, greater feats of bridge-construction were dared by the bridge engineers, and various types of suspension and cantilever bridges, especially suitable for very long spans, were designed and successfully erected. Even the more important wire cable and chain structures of the early 19th century, such as the Schuylkill River Bridge, at Philadelphia, built in 1816, with a span of 408 feet; the bridge across the Menai Strait, between the Island of Anglesey and Carnarvonshire, in Wales, completed in 1826, with a span of 580 feet, and Fribourg Bridge, in Switzerland, built in 1834, with a span of 870 feet, were completely overshadowed by the works of the American engineers during the period dating from 1848 up to the present time. Of these magnificent struc-

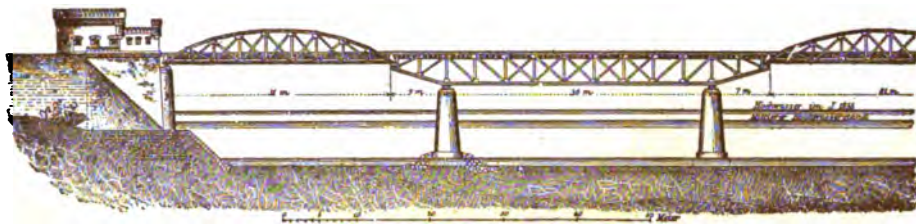
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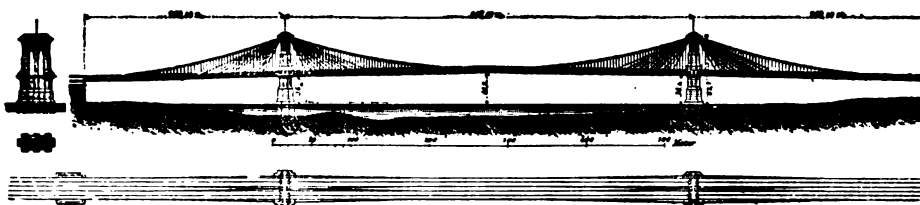
1. Roofed wooden-truss or lattice bridge.
2. Railway bridge over the Douro at Oporto, Portugal.
3. Frith of Forth bridge Scotland.

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TYPES OF BRIDGES.



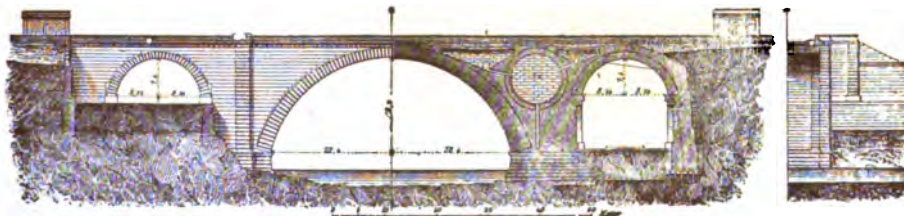
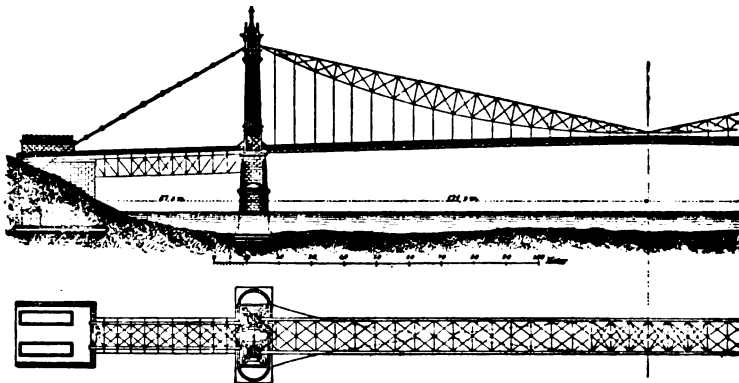
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1. Cantilever Bridge, near Posen.
2. Cable Suspension Bridge, over the East River, New York.
3. Chain Suspension Bridge, over the Monongahela River, at Pittsburg
4. Stone Arch Bridge, near Berna.

BRIDGE

tures, the most notable are the following: The bridge at Wheeling, West Virginia, erected by Charles Ellet, in 1848, with a suspension span of 1010 feet; the Niagara Bridge, built by John A. Roebling, in 1855, with a clear span of 821 feet, and particularly distinguished as the first railway suspension in the world; the Cincinnati and Covington Bridge, built by the same engineer, in 1867, with a clear span of 1057 feet, and a total length of 2252 feet; and the last creation of the same engineer, the 1st New York and Brooklyn Suspension Bridge, across the East River, which was completed in 1883. This bridge connects Park Row, Manhattan, with Sands and Washington streets, Brooklyn. It was begun in 1870, and completed in 1883, at a cost of \$9,000,000. It has been altered, repaired and extended so that its total cost in 1912 was about \$22,400,000, or more than any other bridge in the world. The original structure consisted of a main suspension span of 1595½ feet, and two shore spans of 930 feet each. With the approaches it had a total length just under 6000 feet, but these approaches have been extended so that the total length of the bridge with extensions is now 7580 feet. The four steel wire cables are each 15¾ inches in diameter, and support the roadway and the stiffening trusses at a height of 135 feet above high water level, at the centre of the span. The combined supporting strength of the cables is 48,000 tons. The cables are carried over saddles on the tops of two stone towers, each 278 feet above high water, and anchored at each end in solid cubical structures of stone masonry 119 x 132 feet, which rise to 90 feet above high water. The width of the bridge is 85 feet, and there are four tracks, two of which carry the cars of the elevated road, and two for surface trolley cars. There are also two driveways and a footway. The traffic on this bridge is greater than on any other. About 125,000 surface cars cross each month and about \$75,000 is received annually in carriage tolls.

The Williamsburg bridge is noteworthy as being the first great suspension bridge to employ steel instead of masonry towers, and as having the longest suspended span built up to 1912. It connects Delancey street, New York, with South Fifth and Sixth streets, Brooklyn, and was completed in 1904, requiring eight years for construction. It has a clear span of 1600 feet, and a total of length of 7308 feet. Four steel wire cables, each 18¾ inches in diameter, swung from two steel towers, each 333 feet above high water, support the roadway platform and the stiffening trusses at a height of 140 feet above high water level, at the centre of the span. The width of this bridge is 118 feet and the roadways are on three levels, so that it has greater carrying capacity than the Brooklyn bridge, though the traffic is less. On the lower level are four tracks; on the second, two vehicle ways and two footways; on the third, tracks for elevated cars. The tower foundations were sunk 66 feet on the New York side, and 107 feet on the Brooklyn side, at the lowest points, so that the extreme height of structural work is 440 feet. There are more than 17,000 miles of wire in the cables, and the four cables with suspenders weigh 4900 tons. The weight of steel and iron in the main bridge is 23,800 tons, and in the approaches 16,600. The

anchorages measure 149 x 128½ feet at the top. The cost, exclusive of land, was \$14,000,000.

The Queensborough or Blackwell's Island Bridge crosses the East River from New York to Brooklyn at the southern end of Blackwell's Island, on which rest two of its piers. The main bridge is a continuous cantilever, and the spans are 1052, 630 and 1182 feet respectively from west to east. The total length from Second avenue to Crescent street is 7449 feet. Construction was begun in 1901 and completed in 1909, the cost (excluding land) being nearly \$13,000,000. The width is 90 feet, the roadways being 53 feet, with 16 foot sidewalks. There is 135 feet clear space under the main span for a width of 400 feet, this being practically identical with the vessel-space under the other New York and Brooklyn bridges. The total of steel and iron employed is 74,500 tons. The towers bear observation balconies on Blackwell's Island which reach a height of 333 feet above high water, and are reached by stairways and elevators.

The Manhattan Bridge connects the Bowery and Canal streets, New York, with Nassau street, Brooklyn. Work was begun in 1901 and completed in 1911. The structural expense was \$14,000,000, and it has the greatest transporting capacity of any bridge up to its date. It is of the suspension type, having a river span of 1470 feet, with shore spans of 725 feet. The total length with approaches is 6855 feet. It is 122½ feet in width and is double-decked, and this tremendous roadway requires for its support four of the largest cables constructed to date, each 21¼ inches in diameter. The total ultimate strength of these cables is 120,000 tons, or two-and-a-half times that of the Brooklyn bridge cables. The cables run over the steel towers at a height of 322 feet above high water, and with their suspenders they weigh 8000 tons.

There are 37 strands in each cable, and 256 wires in each strand, making a total of 9,472 wires in each of the four cables. As each wire is more than half a mile in length, (3,223½ feet) the total length of wire is sufficient to girdle the earth at the equator. The weight of steel in each anchorage is 1,300 tons, and of each side span 5,000 tons. The main span weighs 9,000 tons, and the Manhattan approach 8,500 tons, and the Brooklyn approach 8,000 tons. The excavation for each anchor pier was about 40,000 cubic yards, and the masonry and concrete in each of the anchor piers totaled approximately 115,000 cubic yards, far the heaviest ever laid.

The towers weigh 6300 tons each, and the three spans weigh 19,000 tons. On the lower deck are two subway tracks, driveways and footwalks. Above are four railway tracks to accommodate surface and elevated cars. The above-described four great bridges over one river, within a distance of five miles, erected at a total cost (with land and approaches) of about \$89,000,000, constitute the most marvelous achievement the world has recorded in bridge-building.

Another remarkable bridge is projected over the East River, at Hell Gate, a few miles north of the group just described. This marks a step in advance in arch construction, having a 1000-foot steel arch, designed to carry the four tracks of the Long Island Connecting Railway. The structure's height is 265 feet, and 18,000 tons of steel are employed. Gustav Lindenthal is

BRIDGE

the designer, and he has also designed a bridge of over 3000 feet span to cross the Hudson from New York to Weehawken.

The Spokane-Portland Railway finished in 1909 a drawbridge over the Willamette River below Spokane, which has a draw span of 521 feet, being one of the longest ever built. The total length of the bridge is 1762 feet, and the piers are of reinforced concrete.

The most noteworthy bridge of the far North is that over Copper River, Alaska, completed in 1910 for the Alaskan Railway. No such difficult bridge engineering has been undertaken before in such a cold climate. Owing to the nearness of large active glaciers, which at times filled the river with great masses of broken ice, the bulk of the construction work had to be completed within a few months' time. Four steel camel-back spans totaling 1550 feet constitute the bridge proper, the two longest of these spans being 450 feet each. Three concrete piers were sunk in the river, and the entire work completed at the remarkably low cost of less than half a million dollars.

The Erie Railway completed in 1910 a steel viaduct in Jersey City, New Jersey, having a length of 1776 feet, and leading up to a cut in Bergen Hill. This involved bridgework of structural steel, resting on concrete. Owing to the soft nature of the ground, which was largely wet sand, it was necessary to sink many concrete caissons, and where the sand was more solid to use concrete piles.

Recent Foreign Construction.—The Quebec Bridge, a cantilever, having the longest span (1800 feet) of any bridge to date (1912), is described under **BRIDGE CONSTRUCTION**. There has not been any such remarkable bridge building in the Old World. Two new bridges were completed over the Rhine at Cologne in 1908, one having 492 feet of span and the other 550 feet. The Risorgimento Bridge, across the Tiber at Rome, was completed in 1911. It has a span of 328 feet, and is chiefly noteworthy because of its historic site, and from the fact that the falsework on which the arch rested during construction was built of steel and concrete, instead of wood.

The Swiss Sitter River viaduct, which was completed in 1911, is only 400 feet long, but is notable because it crosses a gorge 1130 feet high. At Auckland, New Zealand, was completed in 1910, the largest concrete arch in that part of the world, having a span of 320 feet, the minor spans giving the bridge a total length of 960 feet. In Africa, the Sedan Railway has built a bridge over the Blue Nile at Khartum, which was completed in 1909, and which rests on 20 steel cylinders, each 16 feet in diameter, and carried down as far as 60 feet below low water. The seven largest spans of this interesting bridge are each 218½ feet. In Tonkin, Indo-China, French interests have built a bridge over the Red River, a cantilever, of 19 spans, having a total length of 5544 feet. The longest span is 420 feet. The Yunnan System Railway will use the bridge.

The suspension principle has been far more extensively employed in America, and especially in the United States, than in foreign countries. Some of the European suspension bridges, however, are of great beauty of design, such as the structure across the Danube at Buda-Pesth in Austria-Hungary, which is consid-

ered to be the handsomest bridge in the world but, they are entirely outclassed in magnitude by the almost marvelous creations of American engineering genius already described.

Bridges built on the cantilever or balanced span principle rank with those of the suspension and girder-and-arch type for the purpose of spanning great intervals.

In order to trace the evolution of the cantilever-bridge from the girder, and to understand its relation to the truss, a brief mention of the tubular bridges which were originated by Robert Stevenson, engineer of the Chester and Holyhead Railway, England, to carry that railway across the Menai Strait is necessary.

A series of experiments conducted by Stevenson in conjunction with Fairbairn, demonstrated that a rectangular tube with a cellular top and bottom, gave a girder in which the greatest strength was derived from the least amount of material. The result was the construction of the Conway and Britannia Bridges, the former across the Conway River and the latter across the Menai Strait, in 1846 and 1847, respectively. The Conway tube consisted of a single span of 400 feet, and the Britannia of four spans, two of 460 feet each, and two of 230 feet each in the clear. The example set by Stevenson was followed in a few other cases the most important of which was the Victoria Bridge across the St. Lawrence, near Montreal, Canada, built in 1854. It consisted of 24 spans ranging in length from 242 to 247 feet each, and one span of 330 feet. It had a total length of 9144 feet, or nearly one and three-quarter miles, and required about 9000 tons of iron for the construction of the tubes. It was replaced in 1898-99, by a pin-connected truss bridge of 24 spans of 254 feet each, and one span of 348 feet, which represented a total weight of 20,000 tons of steel, but which was capable of sustaining a load five times greater. The Victoria Bridge was the last important structure of this type. It simply disappeared from engineering practice when the special conditions which developed it ceased to exist; but, it led the way to the plate girder bridges. It taught the engineer to cut away all the useless material in his structures and retain only the effective working skeleton, and thus inaugurated a truly scientific method of metal construction, by which the weight of the structure was greatly reduced, and consequently the cost of construction.

In the meantime, the principle of the truss, first enunciated by Palladio, the famous Italian architect, about 1560, and subsequently developed still further, and without doubt independently, by such genius' as Ulric Grubermann, Timothy Palmer, Lewis Wernway, Theodore Burr, William Howe, Wendall Bollman, and others of equal merit, during the period extending from 1754 to 1854, was diverted from its application to wooden bridges, and used in the construction of metal structures. The combining of the truss and the girder was the next logical step in the evolutionary process, and to Roebing belongs the credit of demonstrating the practicability of building long span braced girder or truss bridges with iron and steel as the material of construction. As the cantilever bridges are a class of structures actually composed of hinged continuous braced girders, their intimate rela-

BRIDGES.



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BRIDGE OVER THE RHINE AT BONN, PRUSSIA (Upper).
BRIDGE OVER THE AARE AT BERN, SWITZERLAND (Lower).

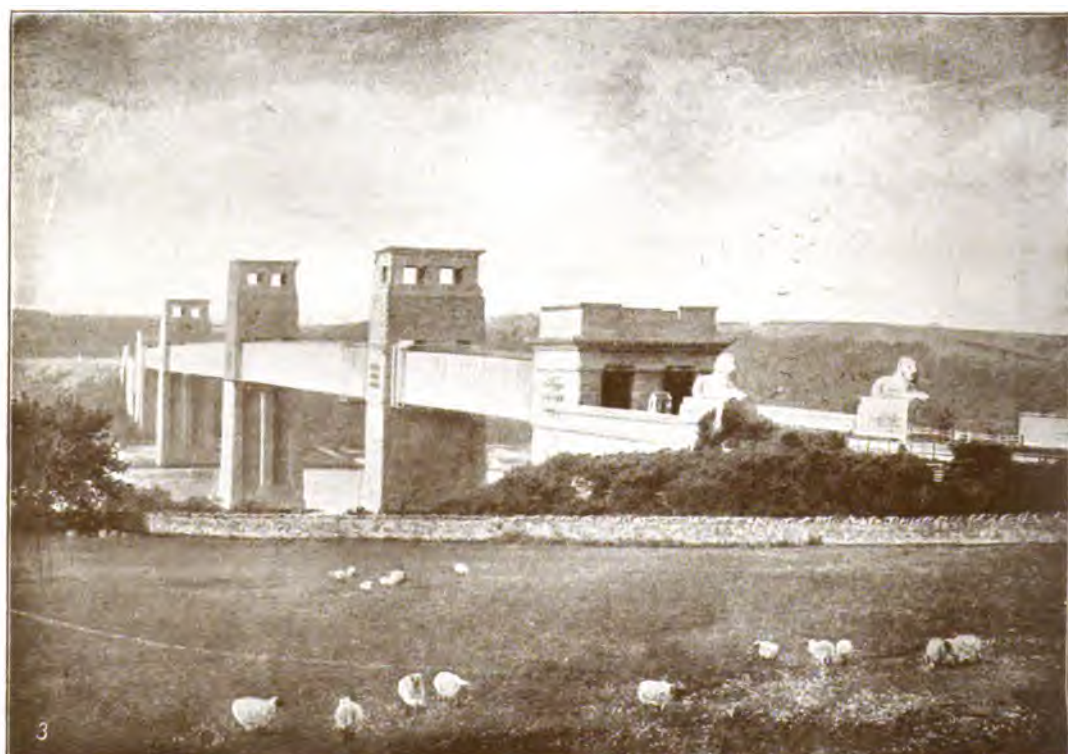
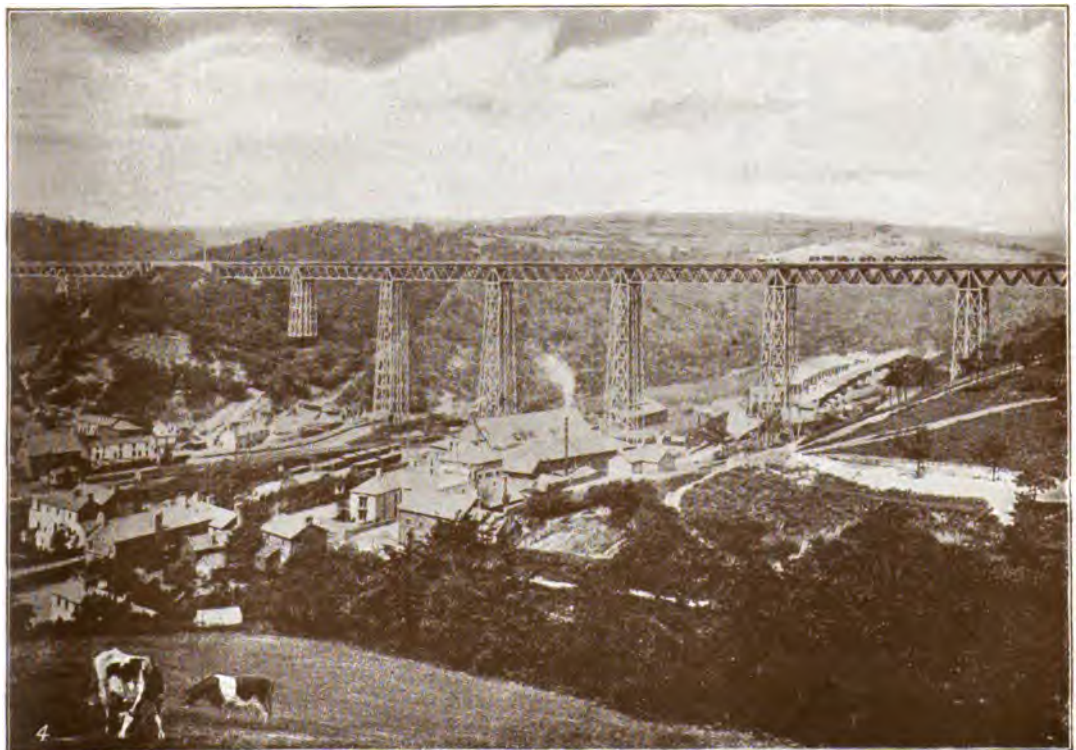


Fig 1 Forth Bridge, from North Queensferry (from a photograph by J. Patrick & Son, Edinburgh).
by Valentine & Sons, Limited, Dundee). BRID
Crumlin Viaduct



IDGES.
 1 Tay Bridge, from north end.
 2 Britannia Tubular Bridge (Figs. 2 and 3 from photographs
 just (from a photograph by Letchford and Stephens, Newport, Mon.).

tion to the girder and truss bridges is quite obvious. They were, however, not much used until the last quarter of the 19th century. The construction of the Kentucky Viaduct in 1876, and the Niagara Cantilever in 1883, demonstrated the ease with which they could be built without the use of costly false work, and soon afterwards many bridges were built both in Europe and America. The most important of these are the following. The bridge across the Hudson at Poughkeepsie, New York, built in 1889, which consists of five river spans ranging from 546 to 548 feet in length, and a total length of 6767 feet; the Red Rock Cantilever Bridge across the Red River in California, built in 1890 with a center span of 660 feet; and a total length of 990 feet; the Memphis Bridge across the Mississippi River at Memphis, Tennessee, built in 1892, with a truss span of 621 feet, and two cantilever spans of 700 feet each, which are the longest of the kind in the United States; the St. John River Cantilever in New Brunswick, built in 1895, with a main span of 477 feet, and a total length of 813 feet; the great Forth Bridge across the Frith of Forth, in Scotland, which was completed in 1890, and consists of two shore spans of 680 feet each, and two main spans of 1,710 feet each, which are the longest cantilever spans in the world but will be exceeded by the Quebec cantilever across the St. Lawrence, the new construction of which began in 1911, and has a clear span of 1,800 feet.

All bridge structures, regardless of the materials of construction, may be divided into three classes—"Beam Bridges," "Suspension Bridges," and "Arch Bridges," which in turn may be subdivided into several other classes according to their modern uses,—such as Railway Bridges, Highway Bridges, Movable Bridges, Pontoon Bridges and Military Bridges.

Modern railway bridges are almost exclusively constructed of steel, and consist of trusses or plate girders designed to sustain uniform loads ranging from 3000 to 4800 pounds per linear foot of track, according to the length of span and the service required.

Highway bridges include all bridges used for roadway purposes alone. They may be constructed of wood, metal, masonry, or concrete, and are usually designed to sustain uniform loads ranging from 1000 to 1800 pounds per linear foot of track, according to the length of span and the service required.

Movable bridges or drawbridges include the various types of structures over rivers, that can be moved in order to allow a clear passage-way for vessels.

The modern structures of this type may be divided into the following classes: (1) Swing Bridges; (2) Rolling Bridges; and (3) Lift Bridges; of which the first are the most commonly used.

A *swing bridge* consists of a wooden or metal truss supported at the center by a pier located in the middle of the stream, so that when the bridge is closed, the ends of the truss rest upon abutments on the shores on either side. It is operated by a turntable, upon which it rests, which is revolved by a rack and pinion arrangement worked by hand power, steam, or electricity.

A *rolling bridge* consists of a single truss mounted on rollers, and which is pushed out

from one side across the span, or of two trusses, on each side of the span which are pushed out, and connected at the center of the span where the water ends are locked together when the bridge is closed. It is operated by the rope and drum method, and is not used to any great extent.

Lift bridges are of various kinds—the "vertical lift," the "hinged lift," and the "rolling lift" bridges. The simplest is the vertical lift bridge consisting of a truss which is raised vertically to the desired height, both ends rising in guides arranged on towers. The hinged lift bridge is raised by being revolved in a vertical plane around hinges at one end. The rolling lift bridge is also lifted in a vertical plane, but has in addition a limited rolling motion. All lift bridges usually have a counter-weight to assist the lifting effort, and are generally designed to move quickly—one minute being frequently specified as the time of opening or closing at points where land and water traffic is heavy.

The longest swing bridges ever constructed are the Interstate Bridge at Omaha, Nebraska, which has a total length of 520 feet; the Thames River Drawbridge at New London, Connecticut, which has a length of 503 feet; and the Anthur Kill Drawbridge between Staten Island, New York, and New Jersey, which has a swing span of 496 feet.

The most notable of the hinged or pivot-bascule bridges are the Tower Bridge across the Thames, near the Tower of London, England, which consists of a suspension and drawbridge combined with a central bascule span of 200 feet, formed by two leaves or trusses, hinged at the opposite towers; and the bridges at Chicago, Milwaukee, Buffalo, and Boston, in the United States.

The modern pontoon bridges are a development of the ancient bridge-of-boats principle. The most notable example of the type is the pontoon bridge across the Hooghly River, at Calcutta, India, which briefly described will serve to convey a very satisfactory idea of such structures. It is 1530 feet in length between the abutments on each bank of the river, and consists of a superstructure carried on 14 pairs of pontoons in the form of rectangular iron boxes with rounded bilges and wedge-shaped ends, which are held in position across the river by means of chain cables laid across, and anchors laid up and down the stream. The superstructure consists of trestle-work, which carries a plank roadway and foot-path platform having a total width of 62 feet at a height of 27 feet above the surface of the river. This height is sufficient to allow ordinary boat navigation, but the passage of large vessels is provided for by arrangements which permit the opening of a span 200 feet wide, by the temporary removal of four of the pontoons and the superstructure carried by them, twice a week.

Military bridges are temporary structures erected to facilitate the movements of troops, their supplies, and their armament, during the course of extensive field operations. The proper equipment of a modern army includes the material required for the construction of pontoon bridges of a limited length. This material consists of the necessary cables, and pontoons of canvas; the metal or wooden frames of which

BRIDGE-BUILDING BROTHERHOOD—BRIDGE CONSTRUCTION

are capable of being "knocked down" and packed for transportation. Spar bridges are usually made with round timbers cut near the location of the bridge. The most efficient and useful are those built in the form of trestles consisting of timber frames on which the stringers carrying the roadway are placed. The most notable examples of military bridge construction in the United States are the pontoon bridge built across the Potomac at Harper's Ferry, under the direction of General Banks, in February, 1862, which was composed of 60 boats, and the trestle 80 feet high and 400 feet long, built at another period of the Civil War across the Potomac Creek, Virginia, for railroad purposes.

For further information see articles entitled **BRIDGE CONSTRUCTION, AMERICAN; BRIDGE CONSTRUCTION, MODERN METHODS OF; FOUNDATION; etc.**

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Bridge-Building Brotherhood, a fraternal religious order formed in the 12th century in southern France. Its object was the building of bridges and the keeping of ferries. Tradition connects its origin with St. Bénézet, through whose efforts a bridge across the Rhone at Avignon was begun in 1117. After the completion of this bridge in 1185 the order received the sanction of Clement III. The order was dissolved by Pius II.

Bridge Construction, American. The application of scientific principles to the construction of bridges is more complete to-day than ever before. This statement applies to the specified requirements which the finished structure must fulfill, the design of every detail to carry the stresses due to the various loads imposed, the manufacture of the material composing the bridge, the construction of every member in it, and finally the erection of the bridge in the place where it is to do its duty as an instrument of transportation.

A close study of the economic problems of transportation in the United States and the experimental application of its results led the railroad managers to the definite conviction that, in order to increase the net earnings while the freight rates were slowly but steadily moving downward, it was necessary to change the method of loading by using larger cars drawn by heavier locomotives, so as to reduce the cost of transportation per train mile. While these studies had been in progress for a number of years and there was a gradual increase in the weight of locomotives, it is only within the past five years that the test was made, under favorable conditions and on an adequate scale, to demonstrate the value of a decided advance in the capacity of freight cars and in the weight of locomotives for the transportation of through freight. The test was made on the Pittsburg, B. & L. E. R.R., which was built and equipped for the transportation of iron ore from Lake Erie to Pittsburg, and of coal in the opposite direction.

When the economic proposition was fairly established, it was wonderful to see how railroad managers and capitalists met the situation, by investing additional capital for the newer type of equipment, and for the changes in road bed and location necessarily involved by that in the rolling stock. Curves were taken out or dimin-

ished, grades were reduced, heavier rails were laid, and new bridges built, so that practically some lines were almost rebuilt. The process is still going on and money by the hundred millions is involved in the transformation and equipment of the railroads. Some impression of the magnitude of the change in equipment may be gained from the single fact, that one of the leading railroads has within a few years expended more than \$20,000,000 for new freight cars alone, all of which have a capacity of 100,000 pounds.

The form of loading for bridges almost universally specified by the railroads of this country consists of two consolidation locomotives followed by a uniform train load. These loads are frequently chosen somewhat larger than those that are likely to be actually used for some years in advance, but sometimes the heaviest type of locomotives in use is adopted as the standard loading. The extent to which the specified loadings have changed in eight years may be seen from the following statement based on statistics compiled by Ward Baldwin and published in the 'Railroad Gazette' for 2 May 1902.

Of the railroads whose lengths exceed 100 miles, located in the United States, Canada, and Mexico, only 2 out of 77 specified uniform train loads exceeding 4,000 pounds per linear foot of tracks in 1893, while in 1901, only 13 out of 103 railroads specified similar loads less than 4,000 pounds. In 1893, 37 railroads specified loads of 3,000 pounds and 29 of 4,000 pounds, while in 1901, 4,000 pounds was specified by 50, 4,500 pounds by 14, and 5,000 pounds by 17 railroads. The maximum uniform load rose from 4,200 in 1893 to 7,000 pounds in 1902.

In a similar manner in 1893 only 1 railroad in 75 specified a load on each driving wheel axle exceeding 40,000 pounds, while in 1901 only 13 railroads out of 92 specified less than this load. In 1893 only 21 of the 77 railroads specified similar loads exceeding 30,000 pounds. The maximum load on each driving wheel axle rose from 44,000 pounds in 1893 to 60,000 pounds in 1901.

The unusual amount of new bridge construction required caused a general revision of the standard specifications for bridges, the effect of which was to include the results of recent studies and experiment, and to eliminate some of the minor and unessential items formerly prescribed.

Meanwhile another movement was in progress. Experience having shown the great advantage of more uniformity in various details and standards relating to the manufacture of bridges both in reducing the cost and the time required for the shop work, an effort was begun to secure more uniformity in the requirements for the production and tests of steel, which is the metal now exclusively employed in bridges.

With greater uniformity in the physical, chemical and other requirements for steel, as determined by standard tests, the unit stresses to be prescribed for the design of bridges will naturally approach to a corresponding uniformity. To what extent this is desirable may be inferred from the fact that the application of several of the leading specifications to the design of a railroad bridge under a given live road yields results which may vary by an amount



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THE BROOKLYN BRIDGE AND SUSPENSION BRIDGE, NO. 3. EAST RIVER, NEW YORK.
 BIRD'S EYE VIEW OF NEW YORK, SHOWING THE BRIDGES BUILT AND BUILDING
 ACROSS THE EAST RIVER.

BRIDGE CONSTRUCTION

ranging from zero to 25 per cent of the total weight.

In the revision of specifications a decided tendency is observed to simplify the design by making an allowance for impact, vibration, etc., by adding certain percentages to the live load according to some well-defined system. It needs but relatively little experience in making comparative designs of bridges under the same loading, to show the advantage of this method over that in which the allowance is made in the unit stresses according to any of the systems usually adopted in such a case. Not only are the necessary computations greatly simplified, but the same degree of security is obtained in every detail of the connections as in the principal members which compose the structure.

Experiments on a large scale are very much needed to determine the proper percentage of the live load to be allowed for the effect of impact, so as to secure the necessary strength with the least sacrifice of true economy. An investigation might also be advantageously made to determine the proper ratio of the thickness of cover plates in chord members which are subject to compression, to the transverse distance between the connecting lines of rivets. The same need exists in regard to the stiffening of the webs of plate girders, concerning which there is a wide variation in the requirements of different specifications.

A movement which has done much good during the past decade and promises more for the future is that of the organization of bridge departments by the railroad companies. The great economy of making one design rather than to ask a number of bridge companies to make an equal number of designs, of which all but one are wasted, is the first advantage; but another of even greater significance in the development of bridge construction is that which arises from the designs being made by those who observe the bridges in the conditions of service and who will naturally devote closer study to every detail than is possible under the former usual conditions. The larger number of responsible designers also leads to the introduction of more new details to be submitted to the test of service, which will indicate those worthy of adoption in later designs. In order to save time and labor and secure greater uniformity in the design of the smaller bridges, some of the railroads prepare standard plans for spans varying by small distances. For the most important structures consulting bridge engineers are more frequently employed than formerly, when so much dependence was placed upon competitive designs made by the bridge companies.

An investigation was made by a committee of the Railway Engineering and Maintenance of Way Association in regard to the present practice respecting the degree of completeness of the plans and specifications furnished by the railroads. It was found that of the 72 railroads replying definitely to the inquiry, 33 per cent prepare "plans of more or less detail, but sufficiently full and precise to allow the bidder to figure the weight correctly and if awarded the contract to at once list the mill orders for material"; 18 per cent prepare "general outline drawings showing the composition of members, but no details of joints and connections"; while 49 per cent prepare "full specifications with survey plan only, leaving the bidder to submit a

design with his bid." If, however, the comparison be made on the basis of mileage represented by these 72 railroads, the corresponding percentages are 48, 24, and 28 respectively. The total mileage represented was 117,245 miles. A large majority of the engineers and bridge companies that responded were in favor of making detail plans.

The shop drawings, which show the form of the bridge, the character and relations of all its parts, give the section and length of every member, and the size and position of every detail whether it be a reinforcing plate, a pin, a bolt, a rivet, or a lacing bar. All dimensions on the drawings are checked independently so as to avoid any chance for errors. The systematic manner in which the drawings are made and checked, and the thorough organization of every department of the shops, make it possible to manufacture the largest bridge, to ship the pieces to a distant site, and find on erecting the structure in place that all the parts fit together, although they had not been assembled at the works.

The constant improvement in the equipment of the bridge shops, and the increasing experience of the manufacturers who devote their entire time and attention to the study of better methods of transforming plates, bars, shapes, rivets, and pins into bridges, constitute important factors in the development of bridge construction.

As the length of span for the different classes of bridges gives a general indication of the progress in the science and art of bridge building, the following references are made to the longest existing span for each class, together with the increase in span which has been effected approximately during the past decade.

In plate girder bridges the girders, as their name implies, have solid webs composed of steel plates. A dozen years ago but few plate girders were built whose span exceeded 100 feet, the maximum span being but a few feet longer than this. To-day such large girders are very frequently constructed. The longest plate girder span was erected on the Mahoning division of the Erie R.R. in 1902 and measures 128 feet 4 inches between centres of bearings. The longest ones in a highway bridge are those of the viaduct on the Riverside Drive in New York, erected in 1900, the span being 126 feet. The heaviest plate girder is the middle one of a four-track bridge on the New York C. R.R. erected in 1901 near Lyons, N. Y. Its weight is 103 tons, its span 107 feet 8 inches, and its depth out to out 12 feet 2 inches.

The large amount of new construction and the corresponding increase in the weight of rolling stock have combined to secure a more extensive adoption of plate girders and the designs of many new details for them. These affect chiefly the composition of the flanges, the web splices, the expansion bearings and the solid floor system. Although solid metal floors built up of special shapes were first introduced into this country 15 years ago, their general adoption has taken place largely within the past decade on account of their special adaptation to the requirements of the elevation of tracks in cities. Solid floors may not only be made much shallower than the ordinary open type, thereby reducing the total cost of the track elevation, but they also permit the ordinary track con-

BRIDGE CONSTRUCTION

struction with cross-ties in ballast to be extended across the bridge, thus avoiding the jar which otherwise results as the train enters and leaves the bridge, unless the track is maintained with extraordinary care.

The necessity for bridges of greater stiffness under the increased live loads has also led to the use of riveted bridges for considerably longer spans than were in use six or seven years ago. The use of pin-connected trusses for spans less than about 150 feet is undesirable for railroad bridges, on account of the excessive vibration due to the large ratio of the moving load to the dead load or weight of the bridge itself.

While riveted bridges are now quite generally used for spans from 100 to 150 feet, they have been employed to some extent up to 425 feet. The recent forms of riveted trusses do not, however, conform to the general character of European designs, but embody the distinctively American feature of concentrating the material into fewer members of substantial construction. With but rare exceptions the trusses are of the Warren, Pratt, and Baltimore types with single systems of webbing. At a distance where the riveted connections cannot be distinguished, the larger trusses have the same general appearance as the corresponding pin bridges.

The recent examples of viaduct construction with their stiff bracing of built-up members and riveted connections exhibit a marked contrast to the older and lighter structures with their adjustable bracing composed of slender rods. The viaduct which carries the Chicago & N. W. R.R. across the valley of the Des Moines River, at a height of 185 feet above the surface of the river is 2,658 feet long. It was built in 1901, is the longest double-track viaduct in the world, provided those located in cities be excluded, and is an admirable type of the best modern construction. The tower spans are 45 feet long and the other spans are 75 feet long. Four lines of plate girders support the two tracks. Along with this viaduct should be mentioned the Viaduct Terminal of the Chesapeake & O. R.R. at Richmond, Va., whose length, including the depot branch, is 3.13 miles. A large part of this is not very much higher than an elevated railroad in cities. The excellent details and clean lines of this substantial structure give it a character which is surpassed neither in this country nor abroad. It may be added that the highest viaduct in this country, and which was rebuilt in 1900, is located 17 miles from Bradford, Pa., where the Erie R.R. crosses the Kinzua Creek at a height of 301 feet. It has a length of 2,053 feet.

While the elevated railroads which have been built recently also embody many of the characteristics of the best viaduct construction, special study has been given to improve their æsthetic effect. The use of curved brackets, of connecting plates whose edges are trimmed into curves so as to reduce the number of sharp angles, and of rounded corners of posts, constitute some of the means employed. The results are seen in the structures of the Boston Elevated R.R. and in some of the latest construction in Chicago.

One of the longest simple truss spans in America is that of the bridge over the Ohio

River at Louisville erected in 1893. Its span centre to centre of end pins is 546½ feet. Since that time several other bridges of this kind have been built which are considerably heavier, although their spans are somewhat shorter. The most noteworthy of these are the Delaware River bridge on the Pennsylvania R.R. near Philadelphia, and the Monongahela River bridge of the Union R.R. at Rankin, Pa., both of which are double-track bridges. The Delaware River bridge was erected in 1896, each one of its fixed spans having a length of 533 feet and containing 2,094 tons of steel. The Rankin bridge was erected in 1900. Its longer span has a length of 495 feet 8¼ inches between centres of end pins and contains about 2,800 tons of steel.

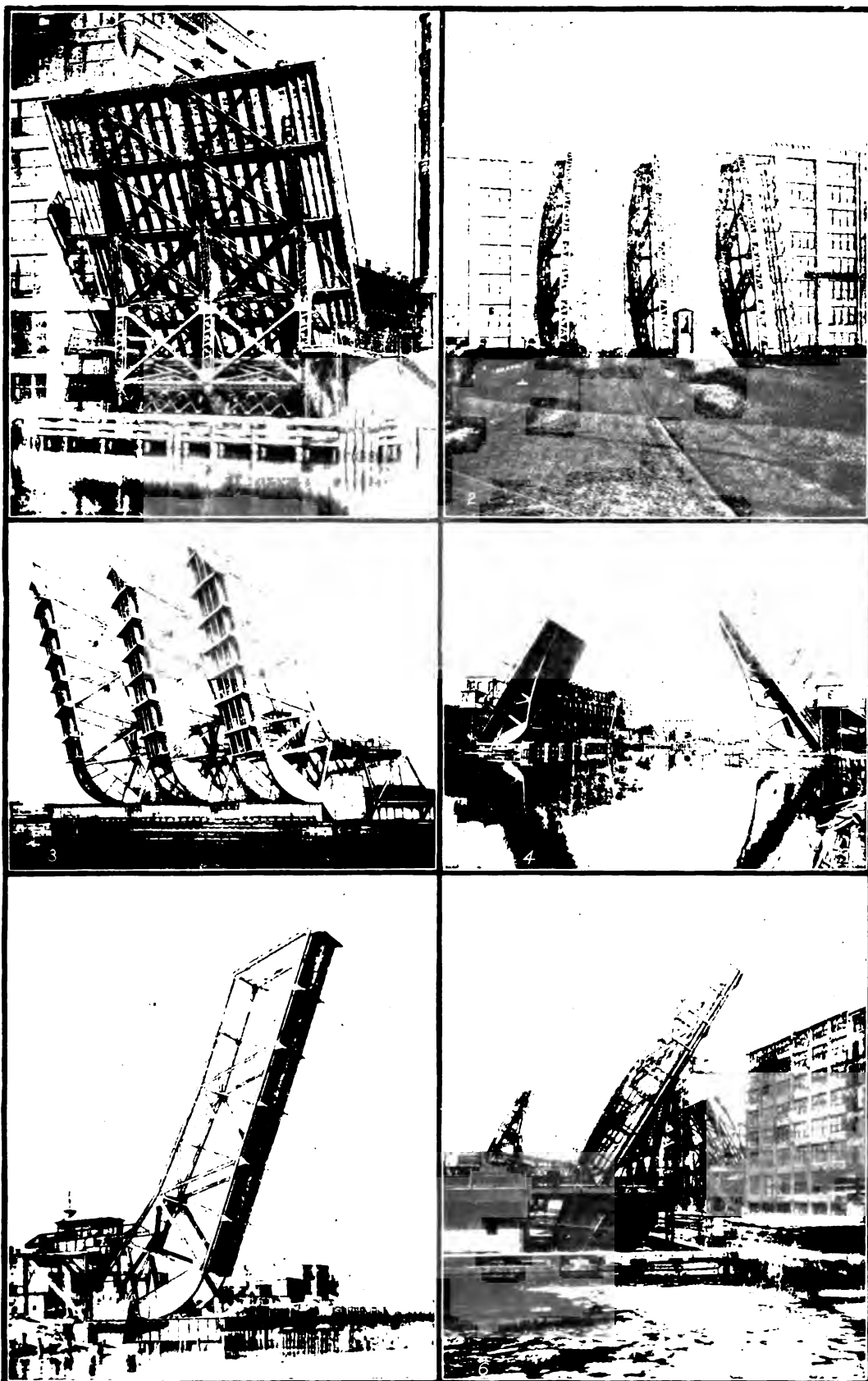
The longest pin-truss bridge spans built up to 1912 are those of the St. Louis Municipal bridge, which are three in number, each 668 feet long. This is a two-deck bridge with double tracks and nickel steel is employed for the main truss braces.

The recent changes in the details of pin-connected truss bridges have been mainly the result of efforts to eliminate ambiguity in the stresses of the trusses, to reduce the effect of secondary stresses, and to secure increased stiffness as well as strength in the structure. Double systems of webbing have been practically abandoned so far as new construction is concerned. The simplicity of truss action thus secured permits the stresses to be computed with greater accuracy and thereby tends to economy. Before the last decade very few through bridges and those only of large span were designed with end floor beams in order to make the superstructure as complete as possible in itself and independent of the masonry supports. Now this improved feature is being extended to bridges of small spans. Similarly dropping the ends of all floor beams in through bridges so as to clear the lower chord and to enable the lower lateral system to be connected without producing an excessive bending movement in the posts has likewise been extended to the smaller spans of pin bridges and is now the standard practice. The expansion bearings have been made more effective by the use of large rollers and of bed plates so designed as to properly distribute the large loads upon the masonry. In the large spans of through bridges the top chord is curved more uniformly, thereby improving the æsthetic appearance. These chords are also given full pin bearings, thus reducing the secondary stresses.

The stiffness of truss bridges has been secured by adopting stiff bracing in the lateral systems and sway bracing instead of the light adjustable rods formerly used. At the same time adjustable counter ties in the trusses are being replaced in recent years by stiff ones, while in some cases the counters are omitted and the main diagonals designed to take both tension and compression.

Some of the same influences referred to above have led to much simpler designs for the portal bracings by using a few members of adequate strength and stiffness in general character to those of the trusses.

Such steady progress in the design and construction of railroad bridges of moderate span has, unfortunately, no adequate counterpart in



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 ROLLING LIFT BRIDGES. Digitized by Google

1 Van Buren Street Bridge, Chicago, Span Open. 2 Van Buren Street Bridge, Chicago. 3 Six-Track Rolling Lift Bridge at South Terminal Station, Boston. 4 Electrically Operated Highway Bridge Across the Chicago River at North Halsted Street, Chicago. 5 Single-Track Rolling Lift Bridge Across Cuva-

BRIDGE CONSTRUCTION

highway bridges. The conditions under which highway bridges are purchased by township and county commissioners are decidedly unfavorable to material improvements in the character of their details. It is a comparatively rare occurrence that the commissioners employ a bridge engineer to look after the interests of the taxpayers by providing suitable specifications, making the design, inspecting the material, and examining the construction of the bridge to see that it conforms to all the imposed requirements. These provisions are only made in some of the cities, and accordingly, one must examine the new bridges in cities to learn what progress is making in highway bridge building.

The lack of proper supervision in the rural districts and many of the smaller cities results in the continued use of short trusses with slender members built up of thin plates and shapes, whose comparatively light weight causes excessive vibration and consequent wear, as well as deterioration from rust. Under better administration plate girders would be substituted for such light trusses, making both a stiffer structure and one more easily protected by paint. The general lack of inspection and the consequent failure to protect highway bridges by regular repainting will materially shorten their life and thereby increase the financial burden to replace them by new structures. Some progress has been made by adopting riveted trusses for the shorter spans for which pin-connected trusses were formerly used, but the extent of this change is by no means as extensive as it should be, nor equal to the corresponding advance in railroad bridges.

The channel span of the cantilever bridge over the Mississippi River at Memphis, Tenn., was for some years the longest one of any bridge of this class in America. It measures 790½ feet between centers of supports. This bridge was finished in 1892, or only two years after the close of the seven-year period of construction and erection of the mammoth cantilever bridge over the Firth of Forth in Scotland. See *BRIDGE (Cantilever Bridges)*. The cantilever bridge erected in 1903 over the Monongahela River in Pittsburg has a span a little longer than that of the Memphis bridge. It is on the new extension of the Wabash R.R. system, and the distance between pier centres is 812 feet. The longest cantilever span is also the longest bridge span at this date (1912). It belongs to the Quebec bridge over the St. Lawrence. This bridge was nearly completed in 1907, when it collapsed, because one of the compression members, designed to sustain a pressure of 30,000 pounds to the square inch, gave way under a load of 16,800 pounds. The failure is ascribed to poor engineering, and a lack of knowledge as to what was to be expected of materials under conditions never before tried. A half million of dollars was expended in inquiry and discussion of new plans, and finally the K system of web cantilevers was decided on, and a heavier bridge planned, of stronger material. The main span of this bridge is 1,800 feet, which includes a central suspended span of 690 feet resting on the cantilevers, which each extend 552½ feet to the piers. The new structure's cost is given at about \$9,000,000. The length between abutments is 3,260 feet. It will accommodate a double track railroad, as well as tracks for

electric cars, and highways. Nickel steel is used in the cantilever arms and in the suspended span. For other long bridges, see *BRIDGE*.

One of the most interesting developments relating to the subject under consideration is the construction of a considerable number of metallic arch bridges in recent years and the promise of their still greater use in the future. On account of their form they constitute one of the handsomest classes of bridges.

The first important steel bridge in the world was completed in 1874. It is the arch bridge which in three spans crosses the Mississippi River at St. Louis. Its arches are without hinges and their ends are firmly fixed to the piers. This is one of the most famous bridges in existence. For a long time after its construction no metallic arches were erected in this country, although many were built in Europe. In 1888, however, the highway bridge across the Mississippi River at Minneapolis was erected, consisting of two spans of 456 feet each and which still remains the longest span of any three-hinged arch. The following year the Washington bridge over the Harlem River in New York was completed. It consists of two spans of 510 feet in the clear and has the largest two-hinged arch ribs with solid web plates. By far the longest steel arch projected up to date (1912) is that of the Hell Gate bridge over the East River, designed by Gustav Lindenthal, for the New York Connecting Railway. See *BRIDGE*.

These were followed by a number of arches of various types, the most noted of which are the two arch bridges over the Niagara River. The first one is a spandrel-braced, two-hinged arch with a span of 550 feet, and replaced the Roebling suspension bridge in 1897. It accommodates the two tracks of the Grand Trunk R.R. on the upper deck and a highway on the lower deck. The other bridge has arched trusses with parallel chords and two hinges. It replaced the Niagara and Clifton highway suspension bridge in 1898, and as its span is 840 feet, it is the largest arch of any type in the world. The manner in which this arch was erected furnishes an illustration of the effort which is made by engineers to conform the actual conditions so far as possible to the theoretic ones involved in the computation of the stresses. Since the stresses in an arch having less than three hinges are statically indeterminate, stresses of considerable magnitude may be introduced into the trusses if the workmanship be imperfect, the supports not located with sufficient precision, and the arch closed without the proper means and care.

The Niagara and Clifton arch was first closed as a three-hinged arch and then transformed into a two-hinged arch by inserting the final member under the sum of the computed stress due to the weight of the truss, and that due to the difference between the temperature at which the closure was made and that assumed as standard in the stress computations. This stress was secured in the member by inserting it when the hydraulic jack which forced apart the adjacent ends of the shortened chords registered the required amount of pressure. The arch had been erected as a pair of cantilevers from each side extending 420 feet out beyond the supports, and when the closure was made the two arms came together

BRIDGE CONSTRUCTION

within a quarter of an inch of the computed value. Such a result involving the "accuracy of the calculation and design of the entire steel work, the exactness with which the bearing shoes or skewbacks were placed, and the perfection of the shopwork" has been truly characterized as phenomenal. In order to reduce secondary stresses to a minimum the members were bolted up during the cantilever erection and the bolts replaced by rivets after the closure of the arch rib.

The past decade witnessed the introduction and extensive development of arches of concrete and of concrete-steel construction. In the latter kind a small amount of steel is embedded in the concrete in order to resist any tensile stresses that may be developed. During this period more than 150 concrete-steel bridges have been built in this country. In the same year in which the largest metallic arch was completed, the five concrete-steel arches of the bridge at Topeka, Kansas, were finished. The largest one has a span of 125 feet and still remains the largest span of this type in America, although it has been exceeded in Europe. Considerably larger spans are included in the accepted design for the proposed Memorial bridge at Washington.

It is the smaller steel structures which are destined more and more to be replaced by arches of this material. The steel bridges require repainting at frequent intervals, constant inspection, occasional repairs, and finally replacing by a new structure after a relatively short life, on account of rust and wear, unless it is required even sooner on account of a considerable increase in the live load. The concrete arch requires practically no attention except at very long intervals.

The safety of operating the traffic makes it desirable to have as few breaks as possible in the regular track construction of a railroad, and this constitutes an additional reason why concrete or stone arches are being substituted for the smaller openings. The decreasing cost of concrete tends to an extension of this practice to openings of increasing size. In 1901, however, a bridge was completed which marks a decided departure from previous practice. The Pennsylvania R.R. built a stone bridge, consisting of 48 segmental arches of 70 feet span, at the crossing of the Susquehanna River at Rockville, Pa. It is 52 feet wide, accommodates four tracks and cost \$1,000,000. This bridge has not only the advantage of almost entirely eliminating the cost of maintenance, but it also has sufficient mass to withstand the floods which occasionally wreck the other bridges on that river. In 1903 the same railroad built a similar bridge over the Raritan River at New Brunswick, N. J.

Of movable bridges the largest swing span existing was erected in 1893 at Omaha over the Missouri River. Two years later a four-track railroad swing bridge was built by the New York C. R.R. over the Harlem River in New York, which is only 389 feet long between centres of end pins, but which weighs about 2,500 tons, and is accordingly the heaviest drawbridge of any class in the world.

During the past decade a remarkable development was made in drawbridge construction by the modification and improvement of some of the older types of lift bridges and the

design of several new types. At South Halstead Street a direct-lift bridge was built in 1893 over the Chicago River, in which a simple span 130 feet long and 50 feet wide is lifted vertically 142½ feet by means of cables to which counterweights are attached. Formerly, only very small bridges of this kind were used, as those, for instance, over the Erie Canal.

In 1895 a rolling-lift bridge over the Chicago River was completed. In this new design as each leaf of the bridge rotates to a vertical position it rolls backward at one end. When closed the two leaves are locked at the centre, but they are supported as cantilevers. This form has been found to have so many advantages for the crossings of relatively narrow streams, where an unobstructed waterway is required and the adjacent shores are needed for dock room, that a score of important structures of this class have been built in different cities. The largest span that has been designed is 275 feet between centres of supports, while the widest one is to accommodate eight railroad tracks crossing the Chicago Main Drainage Canal.

About the same time and under similar conditions another type of bascule bridge was built at Sixteenth Street, Milwaukee, in which, as each leaf moves toward the shore, one end rises and the other falls, so that its centre of gravity moves horizontally, thus requiring a very small expenditure of power to operate the bridge.

Several improved forms of hinged-lift bridges have also been designed and built in Chicago and elsewhere. In a small bridge erected in 1896 on the Erie R.R. in the Hackensack meadows there is only a single leaf hinged at one end and lifted by a cable attached to the other end. The counterweight rolls on a curved track so designed as to make the counterbalance equally effective in all stages of opening and closing the bridge.

A novel bridge was built in 1902 over the ship canal at Duluth which is different from any other type in this country. The general scheme is similar to that of a design made by a French engineer who built three of the structures in different countries. It consists of a simple truss bridge 393 feet 9 inches long, supported on towers at a clear height of 135 feet above high water. Instead of supporting the usual floor of a highway bridge it supports the track of a suspended car which is properly stiffened against wind pressure and lateral vibration, the floor of the car being on a level with the docks. This ferry is operated by electricity. The loaded car, its hangers, trucks, and machinery weigh 120 tons. In the French design a suspension bridge was used instead of the simple truss bridge.

A bridge across the Charles River between Boston and Cambridge deserves especial mention and marks a decided advance in the growing recognition on the part of municipal authorities of the importance of æsthetic considerations in the design of public works. It consists of 11 spans of steel arches whose lengths range from 101½ to 188½ feet. Its width is 105 feet between railings. It is claimed that this bridge "will be not only one of the finest structures of its kind in this country, but will be a rival of any in the Old World." Its length between abutments is 1,767½ feet, and it is estimated to cost about \$2,500,000.

BRIDGE CONSTRUCTION

The problems incident to the replacing and strengthening of old bridges frequently tax the resources of the engineer and demonstrate his ability to overcome difficulties. Only a few examples may be cited to indicate the character of this work. In 1900 the Niagara cantilever bridge had its capacity increased about 75 per cent by the insertion of a middle truss without interfering with traffic. In 1897 the entire floor of the Cincinnati and Covington suspension bridge was raised four feet while the traffic was using it. It may be of interest to state that the two new cables, $10\frac{1}{2}$ inches in diameter, which were added to increase the capacity of the bridge, have just about three times the strength of the two old ones, $12\frac{3}{4}$ inches in diameter, and which were made a little over 30 years before. In the same year the old tubular bridge across the St. Lawrence River was replaced by simple truss spans without the use of false works under the bridge and without interfering with traffic. On 25 May 1902 the Pennsylvania R.R. bridge over the Raritan River and canal at New Brunswick, N. J., was moved sidewise a distance of $14\frac{1}{2}$ feet. Five simple spans 150 feet long and a drawbridge of the same length, weighing in all 2,057 tons, were moved to the new position and aligned in 2 minutes and 50 seconds. The actual times that the two tracks were out of service were respectively 15 and 28 minutes. On 17 October 1897, on the same railroad near Girard Avenue, Philadelphia, an old span was moved away, and a new one, 235 feet 7 inches long, put in exactly the same place in 2 minutes and 28 seconds. No train was delayed in either case. HENRY S. JACOBY,

College of Civil Engineering, Cornell.

Bridge Construction, Modern Methods of:

An instructive exposition of these methods requires a brief consideration of the principles of design and the controlling factors therein.

All framed structures may be divided into two classes—those designed to sustain only a permanent or “dead load,” which acts with unvarying forces, and those which sustain not only the dead load consisting of their own weight, but also the action of a “live load” applied by the movement of railway trains, ordinary vehicles and horses, men, etc., over them.

Roof trusses, cranes, cantilevers, etc., are of the first class, while bridges belong to the second.

All bridge structures may be conveniently divided into three classes—(1) “beam bridges,” (2) “suspension bridges,” (3) “arch bridges.” The first exert only vertical pressures upon the supporting piers and abutments; the second exert a horizontal pull on the towers and anchorages; while the third exert a horizontal push in addition to the vertical pressures.

“Beam bridges” are of a great variety of forms, including those commonly known as simple bridges, drawbridges, continuous bridges, and cantilever bridges. Over 90 per cent of the modern bridges are simple bridges, of which there are two classes—truss bridges and girder bridges. In the former the floor is supported by two or more frame structures, called trusses; in the latter, the floor is supported by solid built-up beams. Girder bridges are generally used for short spans, seldom exceeding 100 feet; but the truss bridges are used for larger spans, and also for spans as short as 50 feet.

A simple framed structure or truss is one composed of straight “members” or parts joined together by pins or rivets, so as to form a rigid framework. The most rigid form is that of a triangle, as it is the only figure the shape of which cannot be altered without changing the length of its sides. It is, therefore, the “truss element,” and all framed structures, no matter how complicated in construction, may be treated as a combination of triangles when no superfluous members are present.

The forces such structures are designed to resist are those of tension, compression, and shearing. These forces when external are called “strains,” while the corresponding internal forces developed in the several members of the structure to resist the strains, are called stresses.

Owing to the frequent confused and indiscriminate use of the terms strain and stress by some authors, a great deal of popular misunderstanding exists as to their exact designations. According to the best authorities, however, a strain is the distortion of a body under the action of one or more external forces, and it is the immediate cause of the stress developed in the body to resist that distortion. Under certain conditions, however, a stress may by reaction and transmission act as an external force, as in the case of the stresses in the masonry supports of a bridge which react upon the superstructure and are in effect external forces and have to be treated as such. In solid bodies, within certain limits, the intensity of the stress is equal to the amount of the strain, and as enunciated by Hooke’s Law, equal increments of one develop equal increments of the other; but, it is evident that stresses cannot thus continue to increase indefinitely in proportion to the strains, and a point is necessarily reached when a greater increment of distortion is required to develop a given increment of stress. This point is known as the “elastic limit.” Below this point, a distorted body returns to its original form and size when the straining force ceases to act; but, beyond the limit, the strain increases more rapidly than the stress, or than the straining force which is always the equal of the stress, and the body does not return to its original dimensions, since a portion of the distortion remains as a “permanent set.”

In the designing of a truss, the members are guarded against “taking a set,” by keeping the working stresses well within the elastic limit of the material of construction.

A bridge truss is designed to act as a beam and it is, therefore, usually subjected to longitudinal strains of tension or compression only, and develops in its members corresponding tensile or compressive stresses. Fig. 1 shows a

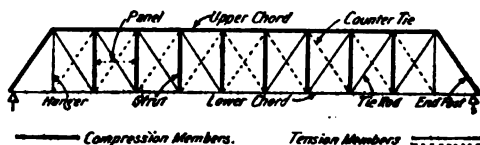


FIG. 1.—Simple Truss.

simple bridge truss with its several members designated as struts, ties or tie-rods, etc., according to the character of the stresses developed in them by the combined action of the dead and live loads.

BRIDGE CONSTRUCTION

In the "struts" the stresses are compressive; in the "ties" tensile. The upper and lower "chords" are placed in compression or tension according to the direction of action of the external forces applied to the structure. In a truss supported at the ends and bearing a downward acting load, the upper chord is always in compression, and the lower chord always in tension. "Counterbraces" are designed to resist both

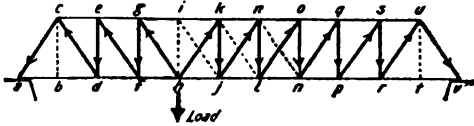


FIG. 2.

tensile and compressive strains alternately, as they may be applied by the changing positions of the load. No truss-member can act simultaneously in full tension and compression, but may do so partially, since the stress developed in any member by the strains of two or more external forces is equal to and of the same sign as the algebraic sum of all those forces. Thus a tie may resist a compressive strain without becoming a counterbrace, or a strut may resist a tensile strain without becoming a tie, so long as the contrary strains are smaller than those for which the member is designed, and which continue to act at the same time.

Fig. 2 shows the action of a truss. As already stated, a truss acts as a beam, and a load applied at (h) will be carried to the abutments at (a) and (v) along the several members as indicated by the arrows, leaving the post (hi), the ties (ij) (kl) (mn), and the hanger (cb) and (tw) idle, and they may be removed without weakening the truss under that particular loading, since it would still remain a combination of triangles properly joined. Fig. 3 shows the conditions with the load applied at (j), with the ties (ij) and (jm) under stress, and the ties (hk) and (kl) idle. Fig. 4 shows

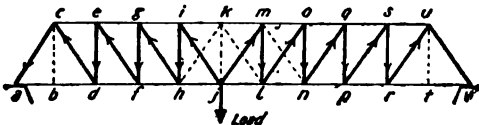


FIG. 3.

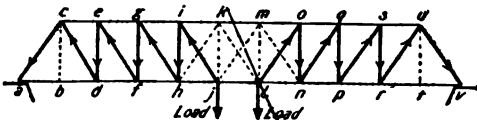


FIG. 4.

two equal loads applied at the middle points (j) and (l). Since the part of the load at (j) going to (v) is just balanced by the part of the load at (l) going to (a), there is no stress in (jk) (lm) (jn) and (kl), nor in the counter ties (hk) and (mn).

From an inspection of these conditions it is obvious that a truss is not weakened on account of a lack of symmetry in the arrangement of its individual members, or as a whole

structure, provided all the members are properly designed to carry their respective loads.

The economy and the efficiency of the truss lies in the panel or quadrilateral system. Fig. 5 shows its development from the triangular

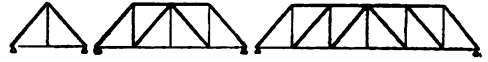


FIG. 5.

king-post truss by the addition of the side panels. It appears that this system was first introduced by Palladio about 1570, but was little used until the close of the 18th century, when it was re-discovered by Burr, and came into extensive use in the United States and is the progenitor of nearly all the forms of bridge trusses now in use in this country, its most valuable feature—a constant angle for the inclined members and its panel system being transmitted to the "Long," "Pratt," "Howe," and to many other later forms of trusses.

The "Bollman," "Warren," and "Fink" trusses, embodying the pure triangular types

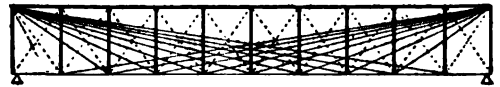


FIG. 6.—Bollman.

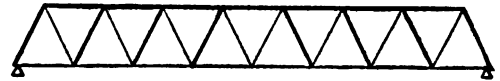


FIG. 7.—Warren.



FIG. 8.—Fink.

(see Figs. 6, 7, and 8), preceded those of the quadrilateral system. They were, however, unstable under the action of a live load which subjected their members to different strains alternately, with a consequential deterioration of the material and a shortening of the life of the

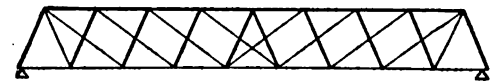


FIG. 9.—Post.



FIG. 10.—Baltimore.

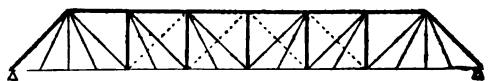


FIG. 11.—Kellogg.

structure. These considerations led to the development of the quadrilateral type in which each member is required to resist a strain of only one particular character. Of these, the more important other than those already men-

BRIDGE CONSTRUCTION

tioned, are the "Post," "Baltimore," "Kellogg," and "Whipple-Murphy," shown by Figs. 9, 10, 11, 12, respectively. The "Whipple-Murphy" was the first to approach to the modern iron truss-bridges. The first bridge of this type, a span of 146 feet, was built by Whipple in 1852, near Troy, N. Y., on the Rensselaer and Saratoga Railway.

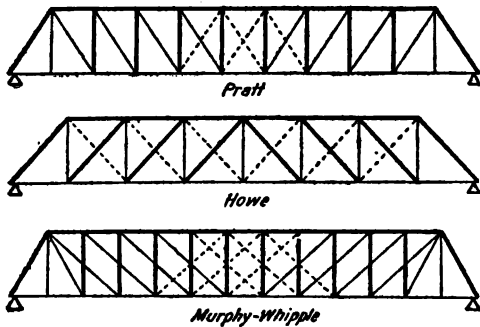


FIG. 12.

In 1861, Linville introduced wide forged eye-bars and wrought iron posts in the web system, while two years later, Murphy substituted wrought iron for all of the compression members, and established in this country the distinctive practice of eye-bars and pin connections, which is still applied to long span steel truss-bridges. The credit of originating the correct theory of truss action, however, belongs to Whipple.

In Europe, the prevailing method of construction is the riveted system, which in this country is limited to plate girders and lattice

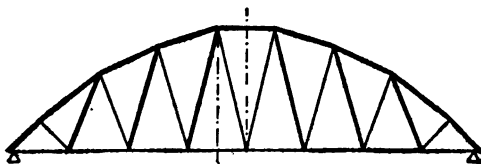


FIG. 13.—Parabolic-Bowstring.

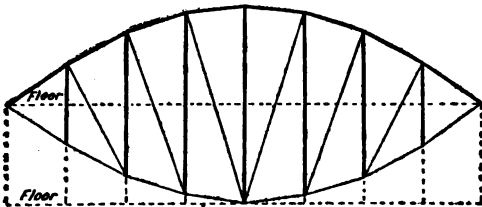


FIG. 14.—Double-Bowstring or Lenticular.

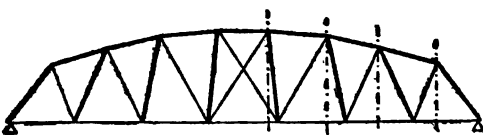


FIG. 15.—Pegram.

trusses of less than 200 feet span. In this system the chords are formed of angles or channel and plates riveted together with splice

joints, thus making them continuous from one end to the other. The web members are riveted to the chords directly, or by means of special plates, which are riveted to both.

Other forms of bridge trusses than those already described, which have many claims to economy and excellence of design, are the "parabolic bowstring," the "double bowstring" or "lenticular," the "Pegram," and the "Petit" trusses, shown by Figs. 13, 14, 15, and 16.

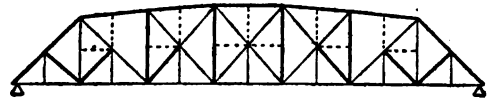


FIG. 16.—Petit.

A plate girder bridge consists of two or more girders connected by systems of lateral and transverse bracings. In its simplest form a plate girder is composed of a vertical web plate to the top and bottom of which are riveted pairs of horizontal angle irons, forming the flanges, and to the ends, vertical angles which transmit the load to the support. The structural forms of girders are modified in many ways to adapt them for different purposes. Increase in the ratio of the depth of the web to its thickness necessitates the addition of "stiffeners." These are vertical angles riveted on to the web in pairs on opposite sides at intervals along the span. As the span increases, two or more web plates are used, spliced end to end. In long spans the flanges also require splicing. See Fig. 17.

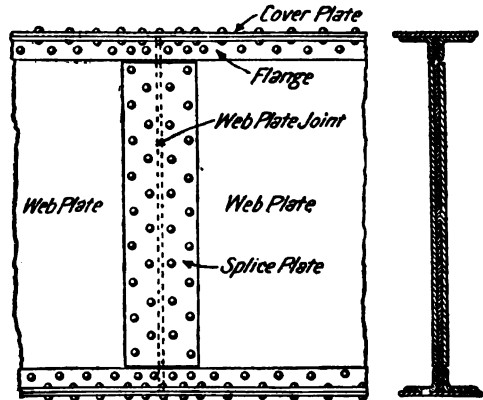


FIG. 17.—Plate-Girder Web-Splice.

There are three general classes of truss and girder bridges used for railroad and highway purposes: (1) "through-bridges," in which the roadway or floor is carried directly by and attached to the bottom chord joints or web plates, and the lateral bracing joins the upper chord joints, and encloses a space for the passage of the load; (2) "deck bridges," in which the roadway is carried on the tops of the girders; and (3) "pony trusses," for short spans, carrying the roadway at the bottom joints but too low to allow upper lateral bracing, so that the trusses are held in place by bracing incorporated with the floor systems. In short spans the girders are arranged to slide upon their supports, base plates being riveted to their

BRIDGE CONSTRUCTION

bottoms and bed-plates to the supports. In spans 75 feet or less, expansion and contraction due to changes in temperature are provided for by the use of hinged bolsters, while for longer spans rollers are introduced between the base and bed-plates. The thickness of the webs and the composition of the flanges of plate girders, relative to the increased stresses developed by greater loads and longer spans, is accurately fixed by experience. In railroad bridges, the web plates ought not to be less than three eighths of an inch in thickness, while those in highway bridges ought not to be less than five sixteenths of an inch; but, in the general design of plate girders, it is well to exceed these values.

In the composition of the flanges, each pair of angles ought to be riveted to the web plate, with their backs projecting a little beyond it, to counteract any lack of straightness in the edge of the web plate, thereby allowing anything to rest upon the flange fairly. When required, additional flange area is obtained by riveting one or more cover plates to the horizontal limbs

in practice in their use varies considerably. It may be broadly stated, however, that the general practice is to use stiffeners $3\frac{1}{2}" \times 3\frac{1}{2}" \times \frac{3}{8}"$ angles for spans below 50 feet; $5" \times 3\frac{1}{2}" \times \frac{3}{8}"$ angles for spans from 50 to 100 feet, and $6" \times 4" \times \frac{3}{8}"$ angles for spans over 100 feet.

The size and weight of web plates are limited by the processes of manufacture and available equipment. Therefore, large girders require several web splices. In their simplest form they consist of plates equal in length to the clear distance between the flange angles, and are riveted to each of the two abutting web plates by two or more rows of rivets, with a pair of stiffener angles attached.

For spans less than 60 feet, splices in the flanges may usually be avoided, as angles and cover plates of sufficient length can be readily obtained. In any case it is more economical to reduce the number of splices to a minimum, even at the additional cost of the extra length angles and cover plates. Flange angles are usually spliced with cover-angles with rounded roots which fit into the fillets of the other angles, while the cover splices are so arranged that the outer cover near the splices may be extended so as to form the splice plate. Fig. 25 shows a very efficient splice, designed in accordance with the best specifications so as to develop the full strength of the net section of the web. The main splice plates extend from flange to flange, and two flats are riveted over the vertical legs of the flange angle, thereby reaching parts of the web not reached directly by the other plates, and adding greatly to the strength of the whole splice. Since the efficiency of a rivet to resist bending strains at a joint is proportional to the square of its distance from the neutral surface, therefore, in a splice of this type, with a web $\frac{7}{16}$ inch thick and 84 inches deep, and the unit stress in the outer fibre 17,000 pounds per square inch, the resisting moment of the gross section of the lower half of the web is equal to 4,373,000 pound-inches, and that of the net section 3,538,200 pound-inches.

The upper and lower flanges of the two or more girders constituting a bridge are held in line by a series of braces, each of which is composed of one or two angles. These braces and the flanges form horizontal trusses, which are called the upper and lower lateral systems. The Warren type, in which the panel points of the upper system are directly above the middle points between the panel points of the lower system, is the one most frequently employed.

Rigid cross frames, each consisting of two struts and two diagonals connected with a stiffener on each end girder, are placed at the ends of the girders and at intermediate points and constitute what is known as transverse or sway bracing.

The floors of "through" railroad plate-girder bridges may be constructed by a system of floor beams and stringers, or made solid. The former method is the one most extensively employed. The floor beams are simply plate-girders of short spans, and are usually placed from 12 to 18 feet apart, and riveted to the main girders, the web splice plates of which are extended to the inner side of the nearest stringers, so as to reinforce the web plate of the floor beams. From each end of the floor beams a triangular gusset plate riveted to the girder extends to the top flange. The outer edge of the gusset plate

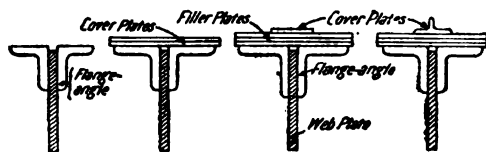


FIG. 18. FIG. 19. FIG. 20. FIG. 21.

of the angles; their number, however, ought to be so limited that the length of the rivets used are not more than five times their diameter. Since the stress in the web plate is transmitted to the covers through the angles, the sectional area of the angles ought to be equal to or greater than that of the cover plates. In a girder, the bending moment requires cover plates of different lengths. This necessitates the notching of the cross-ties unequally. This is obviated by various modifications of the flange—by using a narrow outer cover extending the whole length of the girder and placing filler plates under it, or by the use of two small angles, the cross-ties being notched to fit the vertical legs of the angles. See Figs. 18, 19, 20, 21.

Other methods are illustrated by Figs. 22 and

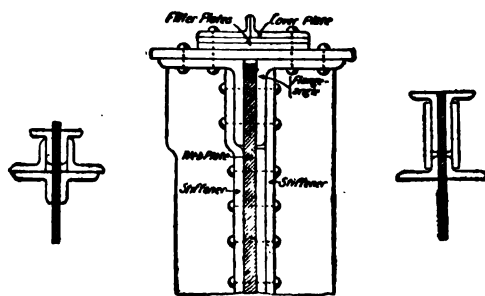


FIG. 22. FIG. 23. FIG. 24.

23, while Fig. 24 shows the section of a flange at the end of a girder.

The functions of intermediate web stiffeners are in a rather undetermined condition, and the

BRIDGE CONSTRUCTION

is stiffened by a pair of angles, which are bent over at the upper ends and riveted to both the flange and stiffener angles.

Either I beams or short plate girders may be used for stringers. In the latter case no cover plates are used and the web plates are allowed to project above the flange angles, the cross-ties being carried upon the top flanges. The arrangement of a floor system, in which the ties rest upon horizontal shelf angles, riveted to the web near the lower flange, or one in which the cross-ties rest on the bottom flanges, which are weakened and the lateral bracing loosened by the spring of the floor, is very objectionable. According to the best practice the cross-ties in deck bridges rest directly upon the top flanges of the two girders supporting each track.

Solid floor construction includes many different types. In some, continuous metal floors support the rails on ordinary cross-ties in bal-

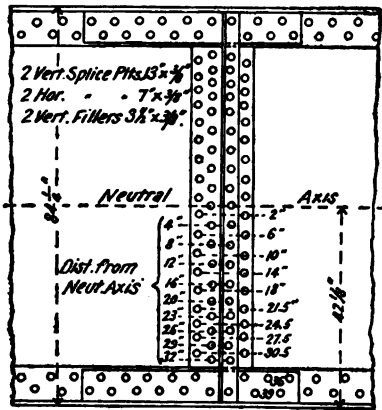


FIG. 25.

last, while in others the ballast is omitted and the cross-ties rest on the metal floor, or the rails rest directly on the metal floor. Solid floors were built as early as 1874, the track rails being laid close together on top of the girders and overspread with the ballast. This gave a

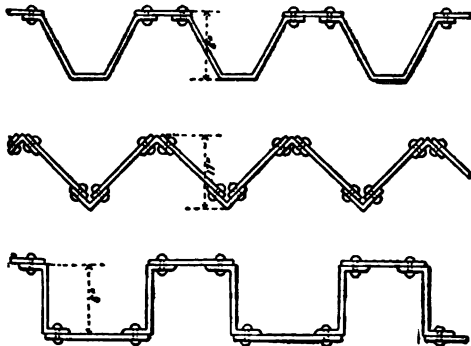


FIG. 26.

continuous track practically free from the objections applicable to the crossing of wooden bridge floors supported on stringers. Floors

consisting of metal troughs were introduced in 1887. They were constructed by riveting together alternately inverted trough plates, as shown in Fig. 26, with the cross-ties laid directly in the troughs or imbedded in ballast. In 1888, the New York Central & Hudson River Railroad adopted this system as a standard for through bridges, and have retained it as such up to the present time for bridges of a limited depth of floor. The necessity for very shallow floors for elevated tracks in large cities, and for plate girders at street crossings, have led to the production of several designs employing I beams and continuous cover plates. The solid floors of highway bridges usually consisted of either a continuous metal floor or one in which the metal was used in combination with concrete or some other material for the permanent foundation upon which the street and sidewalk paving was laid. The latest development in this line is the extensive use of reinforced concrete for both highway and railroad bridges.

Examples of bridges with reinforced concrete floors are quite numerous, and the application of the system is being widely and rapidly extended both in the United States and Europe. Fig. 27 shows the section of a bridge floor constructed of Monier arched plates, and Fig. 28 the floor of a foot-bridge in Lincoln Park, Chicago. The floor beams are placed at the panel points, 18 feet apart, with two beams placed close together, with expansion joints between them, at the centre of the span. From these beams a series of two groups of quadruple steel

FIG. 27.

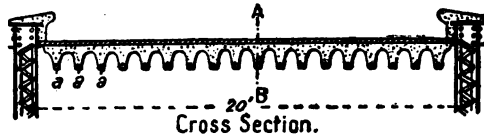
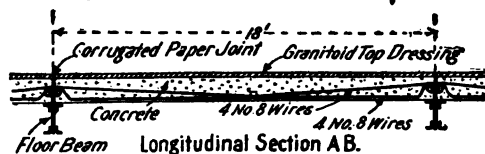
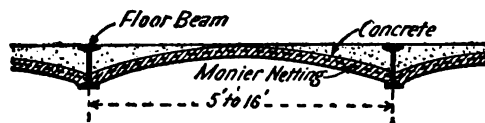


FIG. 28.

wires are carried longitudinally over the intermediate floor beams to the ends of the span. Transversely across the bridge they are spaced horizontally one foot apart and are filled around with concrete composed of one part Dyckerhoff cement, two parts fine torpedo sand, and four parts blast slag rammed into place as soon as the wires are adjusted. In constructing, the longitudinal joints of the false work were placed directly under the points (a), and covered with boards, upon which were placed the forms for making the corrugation. The wires were then stretched under a tension of 60 pounds and secured in the proper position by hook bolts attached to the bottoms of the joints.

BRIDGE CONSTRUCTION

These bolts were removed when the concrete filling was firmly set.

The use of reinforced concrete is not limited to the construction of solid bridge floors. Many concrete-steel arch bridges have been built in the United States, and a much greater number of girder bridges in Europe. The usual girder construction is monolithic, and consists of a slab stiffened with ribs or girders on the under side. Unstiffened slabs are used only for very short spans, such as ordinary box culvert work; while rib-stiffened slabs are applied to spans ranging from 25 to 50 feet. For spans exceeding 50 feet the arch type is almost universally employed, and many concrete-steel arches exceeding 150 feet have already been built, and much larger spans are now being planned. The reinforced concrete arch bridge occupies a medium position between the metal and the stone arch bridges, being almost as light as the former and very nearly as durable as the latter. It is particularly suitable for the foot and highway bridges across railway tracks and small streams and canals, where the requirements of light weight, freedom from corrosion, and low cost are important factors. In the earlier methods of construction only the arch ring was reinforced, but now the reinforcement is applied to the spandrel and parapet walls also; being practically steel skeletons imbedded in concrete. In the earlier bridges the arch was built plain, but the present practice in the United States is in the direction of ribbed arch construction, while in Europe hinged arches are also being used, and the Monier method of construction appears to be the one most extensively used. (a)—Fig. 29 shows a Monier arch at Nymphenburg, Bavaria. It has a span of 87 feet, a total width of 33 feet, and carries a roadway 21 feet

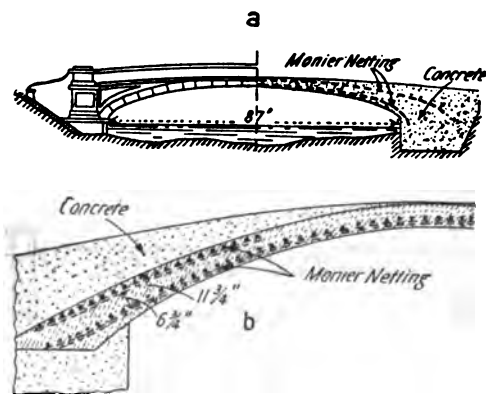


FIG. 29.

wide, paved with wood blocks, which rest directly on the arch ring at the crown and on the concrete filling over the haunches. The structure is designed to sustain wagon loads of 26 tons. The reinforcement consists of continuous steel nets at both the extrados and the intrados of the arch ring. This is known as the "double reinforcement" type, but it is not used so extensively as that shown by (b)—Fig. 29, in which the intradosal net is continuous, but the extradosal extends up the haunches only to a limited distance from the skewback.

In the Wunsch form of construction the reinforcement consists of a series of forms of double T-shaped members, of which the extradosal are placed horizontally, with the flanges upward, and the intradosal conforming to the curve of the arch and placed with the flanges downward. Their webs overlap at the crown of the arch and are riveted together, while the ends are connected by vertical tie rods which extend downward into the pier or masonry abutment, and is anchored to a transverse girder

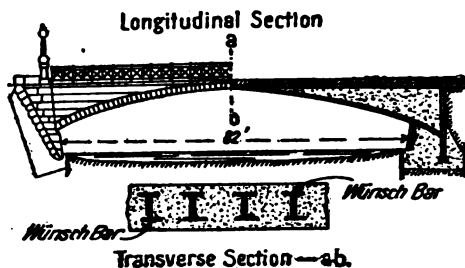


FIG. 30.

extending along the bridge. These frames are placed parallel to each other longitudinally across the arch, at intervals ranging from 18 to 24 inches apart, the ratio of the reinforcement cross-section to that of the concrete at the crown being about 2 to 100. Fig. 30 shows the Emperor Bridge at Sarajevo, Bosnia—a Wunsch arch of about 82 feet span, with a width of 23 feet, one of the longest spans of its kind, and all of the details of construction.

In the Hennebique ribbed arch system, the reinforcement consists of longitudinal arched ribs which carry a floor slab stiffened by trans-

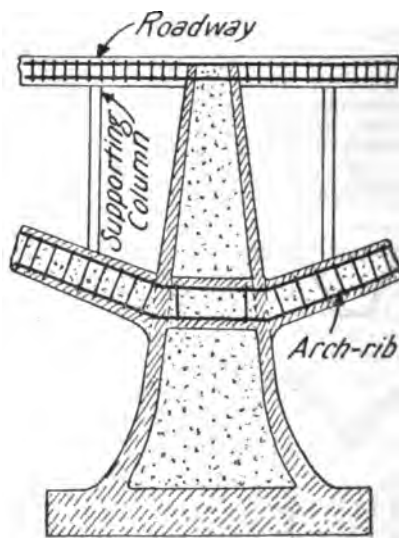


FIG. 31.

verse joints between the ribs. In short spans up to 60 feet the arched ribs are placed from 5 to 10 feet apart, and form the sole reinforcement of the slab. In spans exceeding 60 feet, the arch ring is stiffened intradosally as shown by Fig. 31. The longest span reinforced con-

BRIDGE CONSTRUCTION

crete bridge up to date was built under this system across the Vienne at Chatellerault, France, in 1899. It has a centre span of 164 feet, and two side spans of 131 feet each, making a total length of 443 feet. The arch rings are about 19½ feet wide and carry a roadway platform 26¾ feet in width. It cost about \$35,000.

The "Melan" system employs a series of arched steel ribs placed parallel to each other, at intervals ranging from 2½ to 3½ feet apart. Their shape corresponds closely to that of the depth and profile of the arch ring, which is usually the only portion of the structure reinforced. In short spans the ribs are simply rolled I beams bent to the curve of the arch ring, but in the larger spans they are in the form of lattice steel arches. Perhaps the finest example of foot-bridge construction by this system is the bridge from Laurel Hill to the Ice

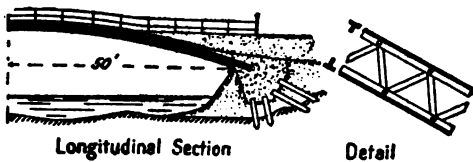


FIG. 32.

Glen, at Stockbridge, Mass., shown in Fig. 32. It has a span of 100 feet, is 7½ feet wide, and is reinforced with four parallel I beams bent to the curves of the arch, with their ends bolted to transverse angles in the abutments. Over 125 bridges, with spans ranging from 12 to 136 feet, have been built in the United States since the introduction of the system by Emperger in 1884. The credit for the most successful introduction of reinforced concrete bridges in the United States, however, belongs to Edwin Thacher, who was the first American engineer to design them according to the elastic theory or the law of flexure in solid arches. His system employs a series of flat steel bars in pairs, placed parallel to each other at proper distances apart. The top and bottom of each pair conform to the curve of the extrados and intrados respectively, and extend for some distance into the abutments or piers. The bars of each pair are not connected with each other, but are provided with rivet head projections spaced at close intervals, which are designed to increase the adhesion of the concrete to the steel. They act in a manner similar to the flanges of an imbedded beam and serve to assist the concrete to resist the thrusts and bending moments applied to the arch. A greater number of concrete steel bridges are built by the Thacher system in the

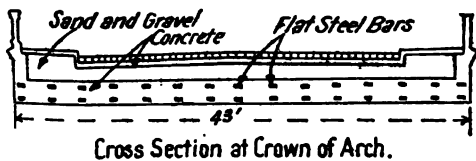


FIG. 33.

United States than by any of the others described. The most notable example is the Thacher Y bridge at Zanesville, Ohio, completed in 1901. It is built at the confluence of

the Muskingum and Licking rivers and has three branches which radiate from the triangular central pier to the three opposite banks. Two of the branches have three spans and the other, two spans, having a total length of 828 feet. The thickness of the arch ring at the crown varies from 18 inches for the short spans of 81 feet to 30 inches for the longer spans of 122 feet, with a width of 43 feet over the arches, and 42 feet between the walls of the parapets. See Fig. 33.

Other important examples are the Jacaguas bridge in Porto Rico and the Green and Goat Island bridges at Niagara Falls, N. Y. The former carries the military road from San Juan to Ponce, across the Jacaguas River at Juana Diaz. It has three spans—a central span of 120 feet and two side spans of 100 feet each, with a width of 20 feet. The Green and Goat Island bridges were constructed in 1900—one from the mainland to Green Island and the other from Green Island to Goat Island. The former, which is the larger of the two, consists of three spans, having a total length of 371 feet, and an over-all width of 44 feet, reinforced by 12 pairs of Thacher bars in each arch ring. It cost a little over \$102,000.

One of the latest systems of reinforcement employs a top and bottom row of corrugated steel bars, ranging from ½ to 1½ inches square placed longitudinally of the arch, and following the curves of the extrados and intrados respectively, with the corresponding bars of the two layers in the same vertical plane.

Increased reinforcement when necessary is obtained by doubling the number of extradosal bars, or by the introduction of transverse bars in each layer of longitudinal bars, so as to form a square-mesh network. The longitudinal bars are usually spaced from 5 to 8 inches apart, and the transverse bars 24 inches apart. In the Seeley Street bridge over Prospect Avenue, in the borough of Brooklyn, New York city—a fine example of the method—additional reinforcement is obtained by stirrups of vertical tie bars, which are located at the intersections of the longitudinal and transverse bars, and connect the longitudinal bars of the extradosal and intradosal layers.

The use of reinforced concrete in the construction of bridges has proved so satisfactory that concrete steel spans of much greater length than those already built have been designed by several well-known engineers, of which perhaps the most interesting and instructive is one by William H. Burr, professor of civil engineering, Columbia University, for a memorial bridge across the Potomac at Washington, D. C. The design was submitted in competition with others at the request of the chief of engineers of the United States army and was awarded the first prize. It calls for a bridge proper composed of a centre-draw span of steel, 159 feet long, flanked on each side by three segmental arches of concrete steel, 192 feet long, with a rise of 29 feet. They are of the ribbed type, with exterior ribs of granite masonry, and interior ribs of concrete steel 30 inches deep at the crown, and 7 feet 3 inches deep at the springing lines.

The great value of reinforced concrete has not only been satisfactorily demonstrated in its application to bridge work but also as a mate-

BRIDGE CONSTRUCTION

rial for many other forms of structures usually built of iron or steel and steel and masonry combined. It is well known that the average life of iron or steel railroad bridges is about 20 years at the most, while a great many deteriorate rapidly under the influence of heavy traffic, atmospheric conditions, and the effects from gases from the locomotives, and have to be replaced in a much shorter time; but, although they cannot compete in durability with masonry structures, the cheapness of iron and steel ren-

In designing any one of these forms of trusses the calculations may be grouped according to their application, to the web system composed of the upper and lower chords, the vertical and end posts, the suspenders and the main and counter diagonals; to the floor systems; and to the lateral bracing and sway bracing. It is not practicable to give in this article detailed descriptions of the various members composing those systems, but Fig. 34 is introduced to show the complete details of a 100 foot

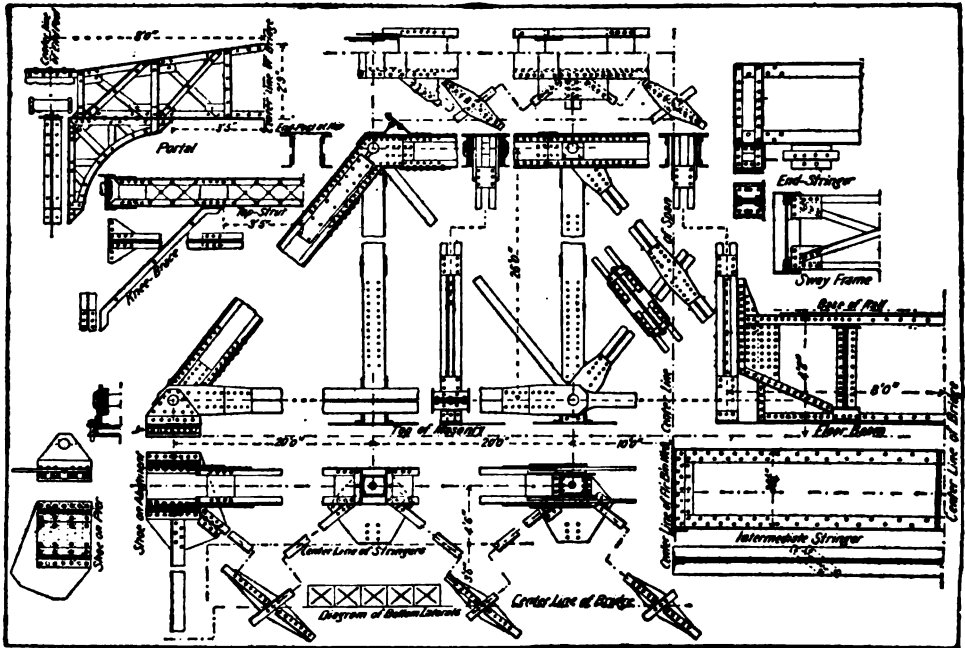


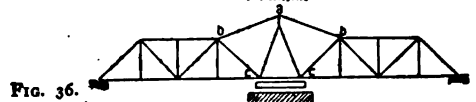
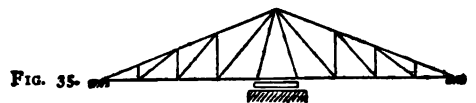
FIG. 34.

ders them more economical, while for bridges of long spans no other material is available. Many roads, however, are replacing their short span iron or steel bridges with arches of masonry or reinforced concrete, which is also applied extensively to the construction of culverts. For further information on the use of reinforced concrete for other purposes than that of bridges and culvert work, see articles on BUILDINGS, CONDUITS, DAMS, FOUNDATIONS, RESERVOIRS, and SEWERS.

According to the best specifications for standard American railroad bridges, the forms of metallic trusses most suitable for various spans may be generalized as follows: Plate-girders for spans ranging from 15 to 75 feet; riveted trusses for spans ranging from 75 to 120 feet; and pin-connected trusses for spans from 120 to 200 feet and over. Riveted trusses are usually of the Warren type, but for spans under 180 feet the pin-connected Pratt truss with inclined end posts is the most economical. As the span increases from 180 to 250 feet it is modified by curving the upper chord and takes the form of a single intersection truss. For longer spans ranging from 250 to 450 feet the newer simple truss bridges employ the Petit or the Baltimore trusses.

span pin-connected truss for a single track through bridge, and will serve to convey a very accurate idea of the design of such a structure.

"Draw bridges" may be classified as "swing bridges," "rolling bridges," and "lift bridges." Swing bridges are of the simple or double type and may be constructed of trusses or girders, so as to be wholly or partially continuous. The earlier forms had a tower over the central pier from which chains extended to the ends of the truss, or the platform. These ends rested freely upon the abutments so that a live load on one



end lifted the other, and the arrangement was entirely bad, approximating to that of the triangular truss shown in Fig. 35, and is now obsolete, while the modern swing bridges are of the

BRIDGE CONSTRUCTION

type shown in Fig. 36. In this design, when the bridge is fully loaded the position of the members (a b) is such that the members (b c) carry the greater part of the load to the turn-table, and insure a better distribution of the load thereon. They are generally known as "centre-bearing" or "rim-bearing," according to the method of supporting the turn-table on the centre pier. Fig. 37 shows the centre-bearing method where the entire weight is carried on the central pivot. It is applicable to short spans. Fig. 38 shows the rim-bearing method where the entire load is carried on a circular drum which moves upon a series of wheels or rollers arranged around the circumference of the turn-

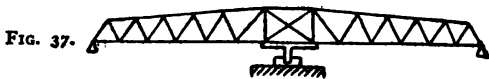


table. As a general rule plate-girder swing bridges have a centre-bearing and truss bridges a rim-bearing, but the style of bearing is usually determined by the available vertical height under the bridge, or the distance from the base of the rail to the top of the pier. There is one serious objection, however, to a purely rim-bearing bridge, which has led to a great deal of thought relative to the proper distribution of the load upon the turn-table. In a purely rim-bearing turn-table no load is carried by the centre pin, and as the rollers, instead of moving in the proper circle get out of line constantly, the centre pin is subjected to more or less lateral displacement. This is partially obviated in the latest designs by so distributing the weight that a portion of it is carried by the centre pin, which not only relieves the weight on the rim, but assists in keeping the rollers in their proper place. Plate-girder swing bridges are the most suitable up to a length of 200 feet. They are stiffer under moving loads, simpler in construction, and more economical than lattice girders or pin-connected trusses.

The machinery employed for operating swing bridges consists of devices for raising and lowering the ends and for turning the bridge. The motive power may be supplied by steam or gas engines, or by electricity, but it is usually in the form of hand power. This power is expended in lifting the ends, in overcoming the inertia of the structure or putting it in motion, and in turning the bridge out of and into position. The simplest way to apply the power to turn a swing-bridge is to exert a pull on its ends by means of an attached rope, and it is a good auxiliary method to be kept for use at any time when the regular driving machinery happens to fail; but in the design of a bridge the operating machinery and the kind of motive power to be employed need to be considered only in connection with the space allowance necessary to house the motor and the attachments to the motor shaft. In general practice these conditions are very well satisfied; but, in the American swing-bridges, the end lifting arrangements are far from being satisfactory, and

it is quite exceptional to find one properly equipped for that purpose when it is closed. A truss acts as a beam, and to be able to determine its reactions by the application of the equations of the "Theorem of Three Moments," it is necessary that it should be supported rigidly at three points. It is obvious that this is not the case if the ends are not raised in the closed position, and entails the greatest difficulty in the determination of the stresses under varying temperatures, so much so that the ends may be thrown out of line to an extent sufficient to derail a train moving on to the bridge, and to

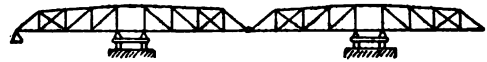
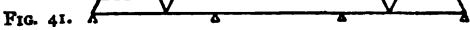


Fig. 39.

make the bridge dangerous at all times. The practice of lifting the ends by wedges as soon as the bridge is closed is objectionable on account of the resulting reactions under a dead load, and the only satisfactory arrangement appears to be the method of locking the ends by bolts or pins, so that no reactions are produced when the bridge is unloaded, or by the construction of double swing bridges as shown in Fig. 39.

"Cantilever bridges" were developed through the decisions resulting from the discussion of the merits and demerits of the continuous bridges built in Europe prior to 1870. It was noted that in a continuous bridge a slight variation in the height of one of the supports produced great changes in the strains and stresses, and that if the chords were cut near the inflection points for full loads those for partial loads would occur at those points also and thus render the reactions statically determinate. In 1860 Ritter proposed to avoid the disadvantages of continuity by cutting or hinging one chord of a three-span truss at its four inflection points, as shown by Fig. 40. His proposition involved



the fundamental principle of the modern cantilever, but the proposed truss was defective owing to its being cut at too many places. A three-span truss has four supports and consequently four reactions under a load. To determine these reactions four conditions are necessary. The principle of statics gives two—tho. the sum of the vertical forces is zero, and that the sum of their moments about any centre is zero. The other two conditions may be established by hinging the chord in two places since the moment of each of the hinges is zero, so that the forms shown by Figs. 41 and 42 are made statically determinate relative to strains and stresses, and not subject to change by a slight change in one support. Furthermore, since their shear and moment diagrams, and that

BRIDGE CONSTRUCTION

of a continuous truss are the same, they preserve the advantages of continuity relative to the distribution of the strain possessed by the continuous truss system, while they eliminate its greatest disadvantages.

The practicability of building out long-span cantilever beams from the opposite banks of a stream until they connected at the middle point was first considered in connection with the principle of the suspension system, in which the truss is supported by cables and stays. Trowbridge proposed to do away with the cables and depend altogether upon the stays for support; but, as it was impracticable to extend the stays conveniently and effectively to the middle of the centre span, he arranged to bridge the interval between the water ends of the anchor spans with a simple truss, as shown in Fig. 43.



FIG. 43.

In the practical application of the principle to the modern cantilever bridges the towers are supplanted by balanced anchor spans, the ends of which are connected by a simple truss. In the simplest form they consist of three spans, as shown in Fig. 44, with the anchor trusses supported at the piers on a single point; but

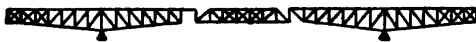


FIG. 44.

a better condition of reactions is obtained by supporting the trusses on the pier at two points, as shown in Fig. 45. The disadvantages of a continuous structure are thus avoided, and by omitting the diagonals in the panel over the pier the reactions at the points a and bc are ren-

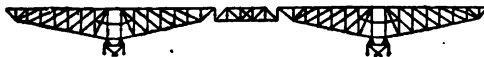


FIG. 45.

dered positive for all loads on the cantilever arm.

The cantilever system is best adapted to long spans where the ratio of dead to live load is great, and is not economical for short spans where that ratio is small. For spans ranging from 500 to 1,500 feet it is as economical as the arch and the suspension bridges; but, for spans

the construction of the piers and the erection of the trusses lead to the conclusion that its selection was practically a mistake. In comparison with continuous structures, the cantilever system has the same advantages possessed by the former over a series of simple trusses of equal spans; that is, in the preservation of the uniform distribution of the moments, and the susceptibility of being erected, panel by panel, where false work is impracticable.

"Suspension bridges" are the type of structures best adapted for long spans. They were very economical when the ultimate strength of steel wire was 160,000 pounds per square inch, and the structures were dimensioned for a working load of 40,000 pounds per square inch, but now, since high grade steel wire having an ultimate tensile strength of 225,000 pounds per square inch is available for suspension cables, the economy and practicable spans of suspension bridges has been greatly increased, and several large structures rivaling those already constructed—notably the Brooklyn bridge, completed in 1883, which has a central span of 1,505 feet, and the Williamsburg bridge, second across the East River, which has a central span of 1,600 feet, and the Manhattan bridge with a span of 1,470 feet—have come into use on a large scale, their economy and other superlative advantages for spans exceeding 1,500 feet, where false work cannot be used, are clearly recognized. The modern improvements in the methods of construction are such that although the last named bridge has a carrying or transporting capacity of more than twice that of the Brooklyn bridge, which consumed thirteen years of labor in its construction, the Manhattan bridge was completed in about seven years of actual work, omitting the time lost where the construction was suspended because of certain misunderstandings. This means that within 25 years the industry of bridge-building had advanced more than three-fold, as regards expedition of construction, and about 25 per cent as regards strength of materials employed. Up to 1905 only three suspension bridges had been completed and used for railroad traffic—the Niagara, the Brooklyn, and the Williamsburg. The Niagara bridge, built in 1854, sustained the wear and tear of heavy railroad traffic for 43 years, its only fault being its large deflection which required slow speed in crossing. The others have proved entirely satisfactory for all the purposes for which they were designed. In the construction of a suspension bridge, see Fig. 46, the anchorages and towers are erected first, then the cables are swung between the towers over which they pass from the anchorages, then the vertical hanger rods are attached to the cables, and finally the stiffening truss which actually car-



FIG. 46.

exceeding 1,500 feet, it cannot be built as economically as the latter, notwithstanding the fact that the Forth bridge in Scotland, one of the most important of its kind, has spans of 1,700 feet, since many considerations relative to

ries the floor of the bridge is built out, panel by panel, from each tower and secured to the hangers. It is common practice to use a system of secondary cables called "stays," which extend from the top of the towers, and are at-

BRIDGE CONSTRUCTION

tached at intervals to the bottom of the stiffening truss out to a distance of one fourth the span, at which point their inclination is tangential to the main cables at the tops of the towers. These stays are superfluous members, as the stiffening trusses can be properly designed to sustain safely all the moments and shears to which they may be subjected, without the aid of the stays, and it is probable that they will be omitted in the structures of the future. As commonly employed, their purpose is to prevent oscillations in the truss under the effects of wind strain or unsymmetrical loads. The use of the stiffening truss may be briefly explained as follows: A suspended cable sustaining only its own weight assumes the curve known as the elastic catenary. In the case of a bridge the weight of the roadway and the live load is much greater than the weight of the cables and produces stresses and elongations which cause them to deflect from the theoretical curve, while additional deflections are produced by the sag of the cables, which increases or decreases with the rising or falling of temperature, and which together with the oscillations caused by wind and the application of unsymmetrical loads make the structures unstable to the point of actual destruction due to a lack of rigidity. It is the office of the stiffening truss to supply this rigidity, and to distribute the effects of partial loads uniformly over the cables. The stiffening truss is necessary only between the towers. In some bridges it extends from tower to tower without breaks in the chords, while in others the upper chord is cut at the middle of the span, or the chords are fitted with sliding joints at that point to allow for the effects of live loads and changes of temperature. Additional rigidity in the structure is obtained by giving the stiffening truss an upward camber in the form of a parabolic curve, the sustaining hangers being provided with sleeve nuts at their lower ends permitting them to be adjusted in length so that the tension upon them is equal under an uniform load. These hangers are all equal in size and are dimensioned to resist a tension equal to the maximum floor load applied to them. They are provided with eye-loops at the upper end, by which they are connected with a bolt to bands that encircle the cables. These cables, instead of hanging in vertical planes, as might be supposed, are "cradled"; that is, they are drawn together at the middle of the span, so that the distance between them at that point is less than at the towers, resulting in slightly decreasing the sag and giving an additional stiffness to the bridge against lateral oscillations, at the expense of only a very small percentage of increase in the stresses of the cable. On the tops of the towers the cables rest freely in movable saddles through which the strains due to loads on the main span are transmitted to the anchorages upon the slightest motion of the saddles on their rollers. See Fig. 47. As this motion cannot occur until the friction of the rollers has been overcome, the strain on the parts of the cables between the towers and the land is less than the strain on the parts between the towers themselves, when the main span only, is covered with a live load. The effect of the difference of the horizontal components of these strains on the tops of the towers is to pull them over toward each other.

To transmit these strains to the anchorages, see Fig. 48, the wires of the cables are passed around pins or terminated in sockets at (a), which are attached to a series of eye-bars, connected with the anchor plate (b), imbedded in the masonry of the anchorages. These eye-bars vary in their inclination until they become vertical at the plate, and are provided with special blocks of iron and stone at the connecting pins at the points of change in direction to resist the strains due to the angular deviation. The



FIG. 47.



FIG. 48.

stresses in the anchor bars decrease with the decrease of the inclination from the vertical, therefore the upward pull on the anchor plate is much less than the strain on the cables. The exact amount of this upward pull is difficult to determine, since the anchor bars are closely surrounded with masonry and concrete, so as to secure the greatest degree of stability and to protect them from corrosion, and are therefore unreachable; but it is supposed that the variation in stress is similar to that occurring in a belt passing around a portion of a pulley. Relative to methods of cable connections, it has been proposed to connect the cables directly to terminal sockets on the water sides of the towers and to connect the back stays in a similar manner to their land sides. The special advantages of the method, however, have never been practically determined.

Many novel methods have also been suggested for stiffening the cables. A system of trussing by which the cables are connected with the roadway has been used to some extent in short span bridges. In such cases, however, it has been found more practicable to make the cables of links or eye-bars, therefore the structures cannot be considered true suspension bridges. Another method provides for a main span hinged at several points, thus converting it into a two-hinged arch if hinged at (a) and (b); into a three-hinged arch if hinged at (a), (c), and (b), and into a cantilever bridge if the system of hinges is applied to the land spans also. See Fig. 49. Two other methods may

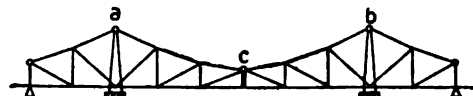


FIG. 49.

be mentioned, although in both cases the structures are inverted arches. Fig. 50 shows a cable trussed on its upper side by bracing which connects it with two straight chords extending from the tops of the towers to the middle of the span. Fig. 51 shows two parallel cables or wire link chains, connected by a system of bracing. This method has been embodied in the specifications and plans for a number of important bridges where a number of railway tracks were used, and very heavy moving loads had to be provided for. It is an open question as to whether the braced cable or the unstiffened

BRIDGE CONSTRUCTION

cable system is the more advantageous for long span bridges. Trussing the cables undoubtedly possesses the advantages due to an increase in the stiffness of the structure under a live load, and the reduction in weight of the roadway trusses; but, since they are actually inverted arches, they possess such elements of uncertainty and complexity due to temperature conditions and live load that they do not appear to be a step in the right direction in the construction of long span bridges.

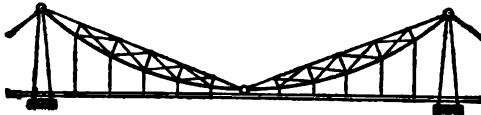


FIG. 50.

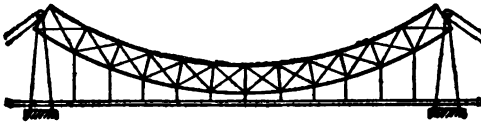


FIG. 51.

"Metallic arch bridges" may be grouped into three principal classes, according to their mode of support or the number of hinges in each truss. (1) Two-hinged arches, with a hinge at each abutment, and continuous throughout; (2) three-hinged arches, with a hinge at each abutment and one at the crown; and (3) continuous arches with the ends fixed rigidly to the abutments. One-hinged arches with the hinge at the crown have been built, but are obsolete on account of their theoretic disadvantages. The simplest and most efficient type is the three-hinged arch, usually composed of a horizontal upper chord, which is united to a curved or broken lower chord by vertical and diagonal bracing, and when thus connected it is designated as "spandrel-braced," and the hinge at the crown is placed in the lower chord, and the floor system is supported directly by the upper chord at the panel points. See Fig. 52. The arch ribs are either metallic built-up girders



FIG. 52.

with solid webs, or with diagonal bracing connecting the flanges. The relative merits of the three types may be briefly stated as follows, together with a reference to one or more of the most notable structures of each type:

In the two-hinged arches the strains and stresses cannot be determined except by taking into account the deformation of the material which is always supposed to occur within the elastic limit; therefore they possess all the disadvantages of continuous structures, and although they require the most careful work in their construction, it is impossible to predict their degree of security under the action of loads that may develop stresses exceeding the

elastic limit of the material. On the other hand, they have a reduced deflection at the crown; their deformation due to temperature is less, and being stiffer than the three-hinged arch, are better adapted than the latter for long spans designed to sustain heavy railroad traffic. The largest two-hinged arches with solid webs ever built are those of the Washington bridge over the Harlem River at New York city, completed in 1889. They have a clear span of 510 feet and a clear rise of 92 feet. The largest steel trussed two-hinged arch in this country is that of the structure which replaced the Niagara Falls and Clifton suspension bridge in 1898. It has a clear span of 840 feet, and a clear rise of 150 feet. The largest arch of this type abroad is that of the Garabit viaduct in France, which has a span of 541 feet and a rise of 213 feet.

Practically all of the remarks applied to the two-hinged arches also apply to arches with fixed ends. The finest example of this type is the Saint Louis bridge, over the Mississippi River, completed in 1874. Its central arch has a clear span of 520 feet and a rise of 47 feet, while the adjacent arches have a span of 520 feet and a rise of 44 feet.

The three-hinged arches are statically determinate structures, in which the reactions and stresses due to any loading can be found without any assumption derived from the theory of elasticity, as exactly as those of a simple beam or truss. Subject to more deflection and deformation, and therefore not as stiff as are the other types, it is unsuitable for heavy railroad traffic, but is eminently satisfactory for highway bridges, and the roofs of train sheds and exposition buildings, where the span is too great for the economical employment of simple roof trusses. The largest arches of this type ever constructed were those of the Liberal Arts Building, at the Columbian Exposition at Chicago, in 1893.

The latest important addition to the list of metallic arch bridges is the structure just completed across the Zambesi, in central Africa, on the line of the proposed Cape to Cairo railroad. It is situated at a short distance below the famous Victoria Falls, and consists of a combination girder and arch, three-span structure, of a total length of 650 feet, the central arch of which has a span of 500 feet, and carries the roadway at a height of 420 feet above the level of the water. All the material was shipped from England and the structure was built in a year.

Bibliography.—For further technical and detailed information consult: Berg, 'American Railway Bridges and Buildings' (Chicago 1898); Burr, 'Stresses in Bridges and Roof Trusses' (New York 1886); Cooper, 'American Railroad Bridges' (New York 1890); Foster, 'Treatise on Wooden Trestle Bridges' (New York 1891); Waddell, 'Pocket-Book for Bridge Engineers' (New York 1898); Warren, 'Engineering Construction in Iron, Steel, and Timber' (New York 1894); Wright and Wing, 'A Manual of Bridge Draughting' (Stanford University 1896). Also consult the 'Transactions of the American Society of Civil Engineers,' and the various engineering magazines and periodicals. WILLIAM MOREY, JR., C.E., *Consulting Civil and Mechanical Engineer, New York.*

BRIDGE DESIGNS

Bridge Designs, Railway. Bridges have been in use from prehistoric times. Even the scientific forms, now looked upon as most modern, were developed in a crude way by the ancients, timber cantilever structures being built by the Chinese in the time of Confucius.

Bridge design, of necessity, continued in an elementary stage as long as timber and masonry were the only materials in use, and long spans were impracticable with such materials, though the "Towne" lattice spans, built entirely of plank connected with hard wood pins, were as nearly perfect as was possible without the use of iron, and some of these spans are still doing effective duty after 80 years of continued use.

The earliest use of iron in bridges began with the use of cast-iron posts and cast-iron arches, but this material was not found entirely satisfactory for long-span bridges. The first real development began with the use of wrought-iron, which was first used in this country in vertical tension members in the "Howe" truss about 1840, and in inclined tension members in the "Pratt" truss about 1845. The use of wrought-iron tension members with wood and cast-iron compression members continued until about 1860, when Howard Carroll, an Irish engineer, assistant to Chief Engineer Gray, of the New York Central, introduced the riveted lattice bridge, built entirely of wrought-iron, which was developed by his successors on that road, and used until very recent years. Wrought-iron plate girders were also first built about 1860.

J. H. Linville, between 1850 and 1860, introduced on the Pennsylvania Railroad a type of truss with flat diagonals and hexagonal rolled-iron posts, and about this same time Bollman and Fink introduced on the Baltimore & Ohio their multiple suspension types of trusses with flat diagonals and vertical iron posts. John W. Murphy adopted Whipple's ideas and developed a truss on Whipple's lines with cast-iron posts and square bar tension members with loop eyes.

A long step in the evolution of properly designed compression members was made by David Reeves about 1864, when he began the use of the rolled iron, round segmental "Phoenix" column, and about that date he also developed the hydraulic upset-end on tension members, which were made by the Phoenix Iron Company, first on round rods and afterwards developed into eyes on flat bars, and these two features were combined in the "Phoenix" bridge, which was far in advance of any bridge construction at that date, and quickly came into very general use. While it still preserved the use of cast-iron for connections, it permanently did away with any further use of cast-iron for compression members, and its simplicity and ease of erection made it by far the best type developed up to that time. Many of these bridges are still in use, and those that have been replaced have generally been removed on account of the great increase of rolling loads to be carried, and not on account of inherent defects in the design.

With the use of "eye bars" the pin-connected type of truss came into practically universal use in this country, since it had great advantages over riveted bridges in many respects; but, owing to its ease of erection, it

was in many cases carried to ridiculous extremes, and spans as small as 25 and 30 feet were constructed with individual members so light and insignificant that the structure had no rigidity. In recent years there has been a very general disuse of this type of construction for spans under 150 feet, and the best engineering practice now calls for riveted structures for small spans, though American engineers still use the pin-connected type for long spans almost universally.

The general principles of railroad bridge construction have not undergone much change in the last 20 years, as practically all spans are built on the general lines of the "Pratt" truss, with vertical compression members and inclined tension members, or on the lines of the "Warren" truss, with all main web members inclined, but the constantly increasing weight of the locomotives in use has tended to the use of heavier and more rigid structures with long panels and as few members as possible, more substantial details, solid floors, stiff lateral and vibration bracing, and other features of present engineering practice, which reduce vibration and add to the rigidity of the structure.

The rapidly increasing capacity of American bridge building shops and their ability to fabricate and handle single members of sizes impossible to obtain a few years ago, has enabled the American engineer to design bridges with practically no shop limitations, and he has thus been free to make designs solely with the idea of producing a structure with the maximum strength and rigidity and the minimum weight of material.

The rapid advance thus brought about would have been impossible had not the ingenuity of the erecting engineer kept pace with that of the designing engineer, but this specialty of erection has reached such an advanced stage that spans of 1,800 feet, with single members weighing 120 tons, are now erected as rapidly as any smaller span.

One of the recent tendencies of American practice has been to substitute plate girder spans for all short bridges, in place of the various types of lattice girders and pin-connected spans heretofore in general use, and very few engineers use any type of steel structure except a plate girder for spans under 90 or 100 feet. Some engineers prefer this type for spans as long as 125 feet. To summarize general practice, it can be said that this type of span is used for spans from 20 to 100 feet, spans under 20 feet being either arches or rolled beams, and spans over 100 feet running into riveted trusses. Plate girders are frequently built with solid floors, with the ties bedded in ballast, and the latest floors of this kind are built of reinforced concrete slabs or arches, as the older trough floors and buckle plate floors have been found unsatisfactory, owing to the impossibility of preventing rapid deterioration from rust. Plate girder spans over 70 feet long generally rest on pin bearings at each end, to allow for deflection, and have cast-steel end shoes.

The usual present practice is to build all spans between 100 feet and 175 feet with riveted trusses, and the old style, multiple-intersection, riveted span has entirely given way to the riveted, single-intersection truss with long panels. For deck spans, the old practice of supporting the ties directly on the upper

BRIDGE DESIGNS

chord has largely disappeared, and either a solid ballasted floor is used, or a regular floor system is laid, consisting of cross floor beams resting on the upper chords, and longitudinal stringers framed between floor beams.

For through spans the ordinary practice is to use a floor system with cross floor beams riveted in between the vertical posts and longitudinal stringers riveted between the floor beams, but in many cases a solid ballasted floor is used, in which case the lower chords are reinforced against bending by supporting them at their middle points from a sub-panel in the truss, or by making deep lower chords capable of withstanding the bending in addition to the direct stress. Fig. 3 shows a 135-foot double track through span with solid floor built with deep lower chord sections.

Spans over 175 feet are usually built with pin connections and, where the span is long, the upper chord is generally curved so as to give a maximum depth at the centre, and truss depths are proportioned so as to give a practically uniform upper chord section throughout. Upper and lower laterals and transverse bracing are now universally built of riveted members, and the older form of tension rods used for purposes of wind and vibration bracing has entirely disappeared. Simple truss spans of this character have been built to a maximum length of 550 feet, which is the length of the channel span over the Ohio River at Louisville, Ky., this being the longest span of its kind in the world, though the 675-foot suspended span of the Quebec cantilever bridge, now under construction, will largely exceed this.

Such spans could and would be built of much greater length if it were not for the fact that in navigable rivers of a magnitude requiring such spans, the government will not allow the waterway to be even temporarily obstructed with falsework, so that for long spans it is more economical to use a cantilever or some other type of structure that can be erected without placing any obstruction in the main channel.

In draw spans, the recent changes in practice have been in the same direction as for through spans, as far as the trusses, floor and bracing are concerned. The practice of counter-bracing the trusses by means of diagonal counter rods has been abandoned, and stiff riveted diagonals are used, capable of carrying either tension or compression where reverse stresses occur. For draw spans of short span or in cities or other situations where there is not plenty of room for a swing bridge, the "rolling lift" bridge has been adopted and has proved most efficient. For long draw spans, the centre pier revolving span is still the type in common use, and for spans up to 400 feet a central pivot bearing is generally used. For spans over 400 feet a rim-bearing turntable drum rolling on a circle of conical, cast-steel wheels has been found most satisfactory, and for very heavy spans two concentric drums and circles of wheels are used.

The use of steam as an operating power for swing bridges has almost disappeared, being replaced by electric motors, which are more economical and do away with many difficulties encountered in the use of steam engines and their boilers.

Fig. 2 shows the 415-foot draw span of the Central Bridge, carrying Seventh Avenue over the Harlem River in New York City, together with the lattice girder approach spans thereto.

The metal arch bridge is a type of structure developed almost wholly in recent years, and there are various modifications of this type, some being built as spandrel arches, in which the web members connect a horizontal top chord with an arched lower chord, having the floor system supported on the top chord or framed in between vertical posts at the top chord level, while others are built as braced ribs, having both chords arched and connected together with the web members, and the floor supported on vertical posts resting on the braced rib at panel points. Each of these types of arch spans is further varied by being built by some engineers with two pin bearings at the two supports, and by others with the addition of a third pin bearing at the crown. It is contended by the advocates of two hinges that the omission of the centre hinge adds considerably to the rigidity of the span, but it has not yet been conclusively demonstrated that the third hinge adds appreciably to the vibration, and this third hinge disposes of the great uncertainty of temperature stresses, and allows the exact calculation of the true stresses and sections by static methods, so that it has considerable advantage and is more in use than the two-hinged type. Many long spans have been built of this type, the longest span being the upper span over the Niagara River, which is a braced rib arch of 840 feet span.

Fig. 4 shows the proposed Henry Hudson Memorial Bridge over the Harlem River in New York City, with a steel arch span of 820 feet.

Suspension bridge design has not been changed as much as other types in recent years, owing perhaps to the fact that this type has not been adopted to any extent for railroad bridges on account of its flexibility, for while a flexible cable can be made sufficiently stiff for comparatively light highway loads, it would require so much material in the stiffening trusses to satisfactorily provide for heavy railroad moving loads that some other type of structure would prove more economical. However, in the few spans of this type which have been recently built, there have been some radical improvements over older designs. The stiffening trusses have been greatly increased in depth and strength, and rocking steel towers with the cables made fast to the top have taken the place of rigid towers with the cables supported on rolling shoes over the top. The three large suspension bridges over the East River between New York and Brooklyn are excellent types of the evolution of this form of structure, and, while the Williamsburg Bridge is the longest span of its kind in existence, having a span of 1,600 feet, the Manhattan Bridge, is the most modern span, and is designed to carry more traffic.

The cantilever bridge has come into very general use in recent years, not because of the economy in metal required, as this type weighs more than a simple truss or an arch of equal span, but because of the great advantage that it can be erected without putting falsework in the main channel. Since the government now prohibits even temporary interference with nav-

BRIDGES, RAILWAY.



1. 812-foot Cantilever Bridge over Monongahela River at Pittsburgh, Pa.
2. 415-foot Draw Span over Harlem River at Seventh Avenue, New York City.
3. 135-foot Through Span with solid floor, W. P. T. Ry. Co., Pittsburgh, Pa.
4. 820-foot Proposed Arch for Henry Hudson Bridge over Harlem River, New York City.

BRIDGE DESIGNS

igation, it has made this type practically mandatory for long spans, as, if any other type is adopted, the span must be erected with additional material, causing it to act temporarily as a cantilever, and this additional erection material overbalances the saving of any type adopted. When the erection is considered, therefore, it has been found that the cantilever is the most economical of all types for long spans, and while some engineers claim that a suspension bridge is cheaper for very long spans, it is certain that equal rigidity cannot be obtained for equal cost by using a suspension bridge on a span of less than 1,500 feet, and even considerably above this span the cantilever will in all probability prove the most economical. For this reason the cantilever has practically become the standard type for all long spans, and several very notable bridges of this kind have recently been completed and are now under construction. The cantilever over the Saint Lawrence River at Quebec, having a span of 1,800 feet, is the longest span of any kind in the world.

Cantilever bridges are comparatively new, but even in the few years in which they have been in use they have been greatly improved in their general arrangement, details, and erection devices. The capacity of the bridge shops to manufacture eye bars as large as 16 inches X 2 inches and 83 feet long, centre to centre of eyes, with pin holes 13 inches in diameter, and heads as large as 36 inches in diameter, as well as to build and ship single compression members weighing 100 tons, together with the ability of the erecting gangs to put these huge pieces in place with moving travelers, has given the designing engineer practically unlimited opportunities, and has brought about the construction of several very large spans of this type in the last two years, notably the 1,800-foot span at Quebec, the 1,182-foot span at Blackwell's Island, N. Y., and the 812-foot span over the Monongahela River at Pittsburgh, Pa. The first two bridges are described elsewhere, and the Pittsburgh cantilever is shown in Fig. 1.

Stone arch bridges are an excellent type for short spans, where the owners can afford the first cost, as the repairs are practically nothing, but this type has not changed in recent years, though in the modified form of the reinforced concrete arch it is being introduced quite generally for ornamental bridges in parks and cities where the æsthetic requirements are more important than economy, and it is an excellent type for this use, but cannot be economically used for long spans carrying heavy loads.

The many wide navigable rivers in this country have given the American bridge engineer unequalled opportunities to show his ability in the design, construction and erection of long spans, and that he has made good use of these opportunities is proved by the fact that the longest span of every type of bridge has been, or is being, constructed by American bridge engineers. In all probability the maximum length of spans has not yet been reached, as it has been proved to be practical to build spans up to 1,800-feet, and there is nothing to prevent the construction of much longer spans, if they are found to be paying investments.

The following is a partial list of the largest spans of various types of steel bridges now built or building:

TRUSS SPANS.

- 690 feet—Suspended span of the Cantilever over the St. Lawrence River at Quebec, Can.
- 630 feet—Fixed span of the Blackwells Island Cantilever, New York City.
- 621 feet—Fixed span of the Cantilever over the Mississippi River at Memphis, Tenn.
- 550 feet—Span over the Ohio River at Louisville, Ky.
- 548 feet—Span over the Ohio River at Cincinnati, Ohio.
- 535 feet—Span over the Delaware River near Philadelphia, Pa.

DRAW SPANS.

- 520 feet—Draw over the Missouri River at Omaha, Neb.
- 503 feet—Draw over the Thames River at New London, Conn.
- 491 feet—Draw over the St. Louis River at Duluth, Minn.
- 415 feet—Draw over the Harlem River, New York.

ARCHES.

- 840 feet—Arch over Niagara River at Niagara Falls, N. Y.
- 721 feet—Arch over Viar River, France.
- 614 feet—Arch over Rhine at Bonn, Germany.
- 595 feet—Arch over Rhine at Dusseldorf, Germany.
- 591 feet—Arch Kaiser Wilhelm Bridge over Wupper River, Mungsten, Germany.
- 550 feet—Arch over Niagara River at Niagara Falls.
- 541 feet—Arch Garabit Viaduct over Truyere River, France.

CANTILEVERS.

- 1800 feet—Cantilever over St. Lawrence River at Quebec, Can.
- 1710 feet—Cantilever over Firth of Fourth, Scotland.
- 1182 feet—Cantilever over Blackwells Island Channel, New York City.
- 820 feet—Cantilever, Lansdown Bridge, India.
- 812 feet—Cantilever over Monongahela River, Pittsburgh, Pa.
- 790 feet—Cantilever over Mississippi River at Memphis, Tenn.

SUSPENSION BRIDGES.

- 1600 feet—Span of Williamsburg Bridge, New York City.
- 1595 feet—Span of Brooklyn Bridge, New York City.
- 1470 feet—Span of Manhattan Bridge, New York City.

The three first mentioned truss spans are parts of large cantilever structures; the longest independent truss spans are those of the St. Louis Municipal Bridge, 668 ft.

The Viar Arch in France is not a true arch, as it is a combination of an arch over the central opening, counterbalanced by two semi-arches extending back over each of the shores.

The Arch spans over the Rhine at Bonn and Dusseldorf, are through spans with the floor suspended from the arch ribs, while all the other arches are deck structures with the floor above the crown of the arch.

This list might be indefinitely extended and many structures might be added which are notable for particular features, such as the extremely flat arch of the Alexander III bridge in Paris, having a span of 362 feet with a rise of less than 19 feet. Many viaducts might also be added, which are notable not from any great length of spans, but from the extreme heights above the gorges they cross. The greatest of these is the Gokteik Viaduct in Burmah, where the track is 825 feet above bottom of gorge.

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Bridge Foundations. See FOUNDATIONS.

BRIDGE SHOPS AND SHOP PRACTICE

Bridge Shops and Shop Practice. The working plant of a bridge company is composed of several shops and departments so arranged in their relation to each other, that the movement of the material handled by them is continuous and in one direction—the rough material entering at one end of the plant and passing out as a finished product at the other. This arrangement insures the reduction to a minimum the time lost in handling, and also the greatest possible economy in the cost of production.

Each of these shops is under the immediate charge of a foreman or superintendent who reports daily to the general superintendent or manager of the plant, who makes out the programme of work, and prescribes the dates upon which the different pieces of work are expected to be completed, the desideratum being to keep the various shops continually working, and to complete the various parts of the bridges in the order in which they are required at the place of erection.

The buildings of the various shops are usually of fireproof construction and conform to the requirements of larger size, good lighting, heating, and ventilation. They are connected by narrow-gauge railway tracks, which run lengthwise through them so as to facilitate the transportation of the material from one part of the works to another with the least amount of handling. Ample yard-room is provided at the ends of the buildings and also around them for the storage of partially completed material awaiting their turn for the finishing touches before shipment. These yards are usually laid out so that the carrying distance is as short as possible, and the work of carrying is accomplished by overhead traveling cranes.

These shops may be designated and described as follows:

(1) "Power Plant," consisting of large batteries of boilers for generating steam, and engines for driving the dynamos through which power and light are furnished to all parts of the works, and other engines for operating the air-compressors which furnish the power for the portable pneumatic drills, riveters, hammers, and reamers, and also the compressed air used for the draft of rivet furnaces, and blacksmith's forges; for the cleaning of finished material, and for painting them by means of spraying devices.

In some cases, the hydraulic pumps and accumulators which supply the water to the hydraulic presses and riveters are also located in the buildings of the power plant, all the machinery of which is installed in duplicate so that in case of an accident it would not necessitate the shutting down of the entire plant during the time consumed in making repairs.

Although the first cost of a centralized power plant is comparatively high, its advantages over that of a scattered system may be briefly summed up as follows: Cheap grades of fuel may be used under the boilers, and mechanical stokers may be employed and thus reduce the number of firemen required by the several boilers of the scattered plants. The number of engine attendants is also greatly reduced, their places being filled by a few electricians to keep the wiring and motors in working condition. The power may be transmitted to every part of the plant with the smallest amount of loss.

(2) "Receiving Yard," where the material for each bridge is properly selected, classified, and stored.

(3) "Straightening Department," where the irregularities in the material, due to the shortcomings of the rolling mill processes, are corrected by more accurate methods. The buckles in the plates, and the deviations from true alignment in the plates are eradicated by passing them through a series of rolls usually consisting of six sets. These rolls are so arranged that the vertical distance between them can be made less at one end than at the other, so that by passing a plate through them several times, it can be stretched unequally and any imperfections in the alignment of its edges thus corrected. Beams, channels, Z-bars, and other odd shapes are best straightened by the application of local pressure to the parts out of line either by screw presses, or by the action of a plunger operated by a power-driven cam. Badly sprung shapes and plates may be straightened by being hammered cold, or after being heated; it is, however, very destructive to the material and should be employed only as a last resort.

(4) "Templet and Pattern Shop," in which the templets for striking the positions of the rivet and pin holes, and the mold patterns for iron and steel castings are made.

A templet is a board or framework of boards, one side of which is an exact representation of one of the sides of the metal shape or piece required to be made. On it, the positions for all the rivet holes, pin holes, bevels and notches are accurately marked, and these are subsequently transferred to the metal piece by punching, scratching or other means, preparatory to the final operations of punching, boring, drilling, reaming, shearing, etc. Templets are usually made of soft white pine boards $\frac{3}{8}$ inch in thickness. When very accurate fitting is required, they are laid out full size on the floor of the shop; but, for small and general work, they are made in separate pieces from the detail drawings. As a rule, as many parts as possible of a structure are designed to be in duplicate so that the number of templets required will be as small as possible, and the final fitting and assembling of the work facilitated and simplified.

(5) "Laying-cut Shop," where each individual metal shape, plate, and piece is accurately marked in accordance with the templets.

(6) "Punch and Shear Shop," where the various plates, shapes and pieces are sheared or cut to the required length and bevel, and the holes marked from the templets are punched by suitable machines. See article under title METAL WORKING MACHINERY in this encyclopedia.

When the thickness of the pieces is greater than the diameter of the punch, punching will unduly strain the material, and the holes will not be straight and smooth. The holes in such plates and shapes are usually drilled, although the process is much slower and more expensive. Single and gang drills are used for this purpose.

Wrought iron and soft and medium steel when of the proper thickness may be easily punched; but, hard steel must always be drilled as it cannot be punched without cracking.

Since the diameters of the edges of a

BRIDGE SHOPS AND SHOP PRACTICE

punched hole corresponds to the diameters of the punch and die respectively, and gives the hole a tapering instead of a cylindrical form, the usual practice is to require all holes, and especially those in the tension members to be reamed to a diameter $\frac{1}{8}$ inch larger than that of the punch, so as to remove all of the material injured by the process of punching.

After passing through this shop, all the material is completely ready to be fitted together and riveted to form the final bridge members for which they were designed to form a part. Each piece when completed is marked with a number or letter designating its proper position in the finished member, and all the pieces belonging to the same structure are marked by a job number so that they may be easily identified in the assembling shop.

(7) "The Assembling Shop." This is usually arranged so that all the heavy work is handled on one side, and the small work on the other. All the different pieces which make up the various members are assembled, fitted and bolted together, and then turned over to the

(8) "Riveting Shop" where the riveting is accomplished by various forms of compressed-air, steam and hydraulic riveters.

When the member exceeds ten tons in weight, it is more economical to use portable riveters than stationary riveting machines. As a rule, hydraulic riveters are the most efficient. They do not get out of order easily, and always exert their full pressure upon the rivets; but, in their portable form they are very cumbersome, and therefore, the pneumatic portable riveters are found to be the most convenient in such cases.

Rivets are made of soft steel, and their lengths ought to be such that when put into the holes they will project enough to furnish a sufficient amount of metal to fill the holes completely when they are compressed. Before insertion they are heated to a cherry red, great care being taken, however, not to burn the metal in the heating, and thereby render them hard and brittle. On the other hand, if driven when they are too cold they will not fill the holes completely, and although apparently all right will be weak in the head. All rivet heads ought to be smooth and free from cracks, and concentric with their holes.

(9) "The Machine Shop" is equipped with an endless variety of metal working machines such as planes, borers and turning machines, etc., which are employed to finish the bearing surfaces of the riveted members, and other parts which are used in their construction such as pins, rollers, beds and sole plates, anchor bolts and the various bearing parts of turntables.

The material for the pins and rollers as usually received from the mills has a diameter $\frac{1}{8}$ inch greater than that of the finished pins, and has to be turned down to the required size and the threads cut on the ends for the pin nuts. The planers are employed to smooth off the faces of the bed and sole plates of the expansion joints.

(10) "The Forge Shop" is equipped to turn out three classes of work—the manufacture of rivets, the general smith work required in a steel structure, and the forging of eye-bars.

The soft-steel bars of which the rivets are

made are first heated and then passed into the rivet making machine where they are upset, headed and cut into the required length at one operation. The rivets most generally employed in structural work range from $\frac{3}{4}$ to $\frac{7}{8}$ inch in diameter.

The operations designated as general smith work consist of the bending of plates, shapes and angles in accordance with the requirements of the drawings, the upsetting of the ends of adjustable tension members, the making of clevises and loop eye-rods, and all forgings such as punches, drift pins, and riveting cups that may be needed by the plant.

All the large tension members of pin-connected structures are made in this shop. The steel flats from which these eye-bars are made are handled as follows: About four feet of one end of the bar is heated to a cherry red in the forge and then placed in the up-setting machine which forms a solid head very nearly the size of the finished head. It is then reheated and placed in the die of the steam hammer and hammered out to the proper size and thickness, and a hole punched in the centre of the head to facilitate the finish boring. A careful watch is kept for flaws, and all of those discovered are cut out since they prevent a perfect weld, and are, no matter how small, a source of weakness in the bar. The head on the other end of the bar is formed in a similar manner. A number of bars are then placed in the annealing furnace and brought gradually to a cherry red temperature, after which they are allowed to cool gradually so as to remove local stresses that might have been induced by the processes employed in upsetting and forging the head. The exactitude required in this work is indicated by Cooper's Specifications, 1901, according to which, Chord pins are required to fit the pin holes within $\frac{1}{16}$ of an inch for pins less than $4\frac{1}{2}$ inches diameter; while for larger pins, the clearance may be $\frac{1}{8}$ of an inch. It is also required that the bars must be bored to lengths within $\frac{1}{8}$ of an inch for each 25 feet of the total length.

(11) "The Painting and Shipping Department" consists of sheds and yards where the material after being inspected and stamped is painted and prepared for shipment.

There are many different kinds of paint employed for this purpose consisting of compounds with mineral, asphaltum, and graphite bases; but, the shop painting required by the usual specifications is one coat of boiled linseed oil which after drying makes a first class base for the final painting in the field after erection. The best method of applying the paint is by the hand with a brush. Spray painting by means of compressed-air has the advantage of greater rapidity, but it is quite wasteful, and unless very carefully done, will not distribute the paint evenly.

After leaving the shops, and before shipment, the material is carefully examined in detail to see that it conforms in every particular to the drawings and specifications, by the inspectors of both the bridge company and the purchaser. A large percentage of this work is done by inspection companies. These companies employ a large number of inspectors who are sent from one place to another to examine the work on hand. The inspection companies bid for the

BRIDGE OF ALLAN—BRIDGEPORT

inspection work at so much per ton of material. Although these companies usually keep a permanent inspector at the works of a large bridge concern, and are therefore able to greatly reduce the cost of inspection to the purchaser, the system is subject to many objections, the principal one being the fact that the actual inspector is personally unknown to the purchaser. The exceedingly satisfactory services rendered by these companies, however, is clearly demonstrated by the large amount of work handled by them, and their high professional reputation.

The general method of inspection may be briefly stated as follows: When the inspector of the purchaser arrives at the works of the bridge company, he is furnished with a set of the plans and drawings of the bridges to be inspected, and starts in at once to familiarize himself with the shops and working methods of that particular plant. He then ascertains the rolling mills from which the rough material for the structures will be obtained, and begins the work of actual inspection at that point. All the material is carefully examined for flaws and surface defects, and tested for strength, and when found satisfactory is stamped by him with a hammer, and then forwarded to the works of the bridge company. Subsequently, he keeps a general oversight of the material as it passes through the various shops and departments of the bridge works until it has passed out of them and is ready for the final examination.

For methods of testing see article under title **TESTING MACHINES** in this encyclopedia.

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Bridge of Allan, a town of Scotland, in Stirlingshire, on the border of Perthshire, on the banks of the Allan, about three miles north of Stirling, with which it is connected by the Caledonian Railway and a line of tramway cars. Owing to the mildness of its climate and the beauty of its situation, Bridge of Allan is a favorite spring and summer resort for invalids. It is built partly on a plateau of considerable height and partly on low ground on the banks of the river, and is finely laid out with trees and public walks. It is frequented partly on account of its mineral wells.

Bridge of Sighs, a bridge in Venice, dating back to 1597. It spans the Rio della Paglia, connects the ducal palace with the prisons, and forms a graceful structure 32 feet above the water, enclosed at the sides and arched overhead. It contains two passages, through which prisoners were led for trial, judgment or punishment.

Bridgeport, Conn., a city, port of entry, county-seat of Fairfield County on Long Island Sound and on the N. Y., N. H. & H. R. R., 50 miles northeast from New York City, 17 miles southwest from New Haven. It is the second city in the state in population. The city and town are conterminous, about 15 square miles in area.

Bridgeport harbor is the estuary of a small river, the Pequonnock, and a tidal inlet, called Yellow Mill Pond, with a peninsula between. The lower part of the harbor is about a mile wide and extends about a mile to the sound. The two arms of the harbor divide the city

into three parts; the main city and chief business centre lies west of the harbor; the section called East Bridgeport with a secondary business street occupies the peninsula; and Summerfield and Newfield sections lie east of the harbor.

Rising from the plain along the Sound are three elevated districts; the nearest Golden Hill, one of the oldest and finest residential sections, farther back are Old Mill Hill to the northeast and North Bridgeport to the north, both commanding fine views of the Sound.

Parks, etc.—Bridgeport is called "Park City" from its numerous breathing places. The principal parks are Seaside, Beardsley, Washington, and Pembroke. Seaside Park contains about 75 acres with a two-mile boulevard along the Sound protected by a strong sea-wall. Here are the Soldiers and Sailors Monument and monuments to Elias Howe and Phineas T. Barnum, the sewing machine of the one and the business enterprise of the other having been largely instrumental in the development of the city. Beardsley Park in the northeastern part of the city contains about 150 acres, to which river and lakeside, woods, and hills give the charm of nature. Washington Park, about 4 acres, lies in the centre of the East Side. Pembroke Park is a long, broad green, an expansion of the Old King's Highway from New York to Boston. The finest cemetery is Mountain Grove, about 75 acres near the western boundary.

The finest residence sections are Golden Hill, central, Fairfield Avenue the main thoroughfare to the west, Seaside Park vicinity in the south, Brooklawn (new) and Clinton Avenue in the northwest, Seaview Avenue along the Sound in the southeast, and Mill Hill and North Main Street with their splendid views.

Public Buildings.—The most notable public buildings are the government building, with the post-office and custom-house; the county courthouse; the Barnum Memorial Institute, bequeathed to the Historical Society and the Scientific Society in common; the Young Men's Christian Association, the Burroughs Library, the Burrough's Home for Women, the Sterling Widows' Home, the Protestant Orphan Asylum and the Bridgeport and St. Vincent's Hospitals.

Manufactures.—Bridgeport is the leading manufacturing city of Connecticut, standing first in the value of products and in the number of employees. It is called "the Industrial Capital." The manufactured products are in great variety, chiefly cartridges, corsets, sewing machines, heavy ordnance, brass goods, electrical apparatus, silver-plated ware, automobiles, torpedo boats, bicycles, gas and gasoline motors, graphophones, typewriters, machine tools, boilers, cutlery. Among the largest manufacturing establishments are Singer Sewing Machine Co. (Wheeler & Wilson) with 10 acres of works, Union Metallic Cartridge Co., Warner Brothers Corset Co., Crane Valve, American Tube and Stamping, Holmes & Edwards Silver-plating, American Graphophone, Union Typewriter Co., Bridgeport Brass Co.

Transportation.—The city by its location has excellent transportation facilities. The railroad trackage is ample. A new station has recently been built and the tracks elevated through the city at a cost of over \$3,000,000. The harbor

BRIDGER'S PASS — BRIDGET

admits quite large vessels. There are daily steamer lines to New York and across the Sound to Port Jefferson, L. I. and much coasting business. The river, creeks, and harbor arms are spanned by a half dozen large bridges. Electric railway service is thoroughly developed, continuous lines running to New York and to New Haven, and thence to Boston.

Education.—The public school system has a High School and 25 grammar school buildings. There are about a dozen private and parochial schools. In 1912 the public schools enrolled 15,733 pupils and employed 375 instructors. A free public library established in 1881 now contains about 60,000 volumes.

Religion.—The religious life of the city centers around some 90 churches. The leading denominations are Roman Catholic, Congregational, Protestant Episcopal, Methodist, Episcopal, Baptist, Lutheran, and Presbyterian.

Social Clubs. There are many social clubs and secret societies. Chief among the clubs are The Seaside, The Algonquin, The Brooklawn Country Club, The University, The Bridgeport Yacht Club. The oldest Masonic lodge, St. John's, dates from 1762.

Government.—The government of the city is committed to the mayor, elected every two years, a board of 24 aldermen, 2 from each district, a board of education, 12 members, elected at large 4 members each year, a board of apportionment and taxation, appointed by the mayor. The mayor also appoints members of the police board, board of health, fire commissioners, library board, park commissioners, board of charities, a city engineer and a director of public works. The city's assessed valuation of property is \$97,676,440, its debt \$1,578,691 and its tax rate about 15 mills per \$1000. The annual outlay is nearly two millions, about a half million being for schools. There are four national banks, five savings banks, two trust companies and a number of private banks. Notwithstanding the proximity of New York, the retail business along all lines is extensive.

Population.—The city has a cosmopolitan population consisting basically of the old New England stock, balanced with the thoroughly Americanized families from Ireland, Germany and Scandinavia. Later additions have been drawn largely from the southern countries of Europe. The growth of population has been as follows: (1810) 1,089; (1820) 1,500; (1830) 2,800; (1840) 3,294; (1850) 7,560; (1860) 13,209; (1870) 18,969; (1880) 27,643; (1890) 48,866; (1900) 70,996; (1910) 102,054.

History.—The first settlement was made in 1639, on lands bought from the Pausgusset Indians, who in 1659 were relegated to a reservation on Golden Hill. It was called Pughquanock or Pequonnock, and formed a parish in the towns of Fairfield and Stratford, where the inhabitants went to church till they built their own first one in 1695. In 1694 they petitioned to have it renamed Fairfield; the legislature chose Fairfield Village instead: they rejected it and the next year fixed on Stratfield, which, however, was not legalized till 1701. In 1703 the first school building was erected, previous teaching having been in the church on week-days. In 1707 the first services of the Episcopalians were held; in 1748 their first church was built. In 1775 a company from here joined Arnold's expedition to Quebec; and there was much pri-

vateering from this place in the Revolution. In 1795 the first newspaper, the *American Telegraph*, was issued. In 1800 the borough of Bridgeport was incorporated, including the village of Newfield, which had grown up at the waterside, the old settlement being along the Boston and New York turnpike, or "Old Stage Road," now in part North Avenue. In 1806 the first bank, Bridgeport Bank, was organized. In 1821 the town of Bridgeport was set off, having then 1,700 inhabitants, 218 dwellings, 73 stores and warehouses, and an assessed valuation of \$24,701. On 28 Sept. 1824, the first steamer ran from Derby past Bridgeport to New York; 16 April 1832, the first Bridgeport steamer, the *Citizen*, began regular trips. The Housatonic Railroad was opened to New Milford in February 1840; the New York, N. H. & H. began running to Fairfield, 2 Sept. 1848, to New York, 1 Jan. 1849. This ushered in the period of real city development, 1850-60. Gas was introduced December 1861; water, 1854-5; P. T. Barnum bought large tracts of land in East Bridgeport and opened it up after 1850; in 1856 the Wheeler & Wilson Company removed here from Watertown and greatly enlarged their plant; the Howe Company came in 1863, and the Union Metallic Cartridge Company in 1865. In 1870 the city annexed a part of Fairfield; in 1899 Summerfield, and West Stratford across Pembroke Lake. (See Orcutt's 'History of Stratford and Bridgeport,' 1886.)

Revised by CHAS. W. DEANE.

Bridger's Pass, a Rocky Mountain defile in southern Wyoming, several miles in length and having a high elevation. Its walls, almost perpendicular, rise from 1,000 to 2,500 feet. Before the opening of the Pacific Railroad it was a feature of the overland stage route.

Bridges, Robert, American iron-worker. Extremely little is known of him personally. He settled at Lynn, Mass., and in 1643 organized a company to work the deposits of "bog iron-ore" in that vicinity. He went to London, and organized a "Company of Undertakers for the Iron Works," comprised of wealthy Englishmen, who advanced £1,000 for the work. Foundrymen were brought from England and Scotland, a plant was established on the Saugus River, and for several years furnished most of the iron used in this country, though ultimately the undertaking failed, owing to the scarcity of money and difficulty of making collections. In 1645 Bridges was a commissioner to confer with the governors of the French provinces in Canada. The Colonial records show him to have been a member of the general court, and its speaker in 1646.

Bridges, Robert, English poet: b. 23 Oct. 1844. Educated at Eton and Corpus Christi College, Oxford, he afterward studied medicine and held several hospital appointments, retiring from the active exercise of his profession in 1882. He is one of the most scholarly of modern English poets and has published, usually privately, eight plays and several collections of poems. Among his works are 'Prometheus'; 'Achilles in Scyros'; 'Eros and Psyche'; 'Shorter Poems'; 'Milton's Prosody.'

Brid'get, the name of two saints in the Roman Catholic Church.

1. SAINT BRIDGET, or SAINT BRIDE, b. Fochard, Armagh, Ireland, about the beginning of the 6th

BRIDGETON — BRIDGEWATER

century. She was exceedingly beautiful, and to avoid the offers of marriage and other temptations to which this worldly advantage exposed her, implored God to render her ugly. The prayer was granted, and, retiring from the world, Bridget built herself a cell under a large oak, hence the name Kill-dara or Kildare, the cell of the oak. Hither she was followed by numerous other virgins, and an order of nuns was established which spread into different countries and flourished for centuries. Saint Bride is one of the chief Irish saints, and was held in great reverence in Scotland.

2. **SAINT BRIDGET, BIRGIT, or BRIGITTE**, daughter of a Swedish prince: b. about 1302; d. Rome, 1373. At the age of 16 she married Ulf Gudmarssen, afterward seneschal of Nericia, by whom she had eight children. Her husband and she then made a vow of mutual continence. On her husband's death she founded the convent of Wadstena, in East Gothland, under the rules of Saint Augustine. She made a pilgrimage to Palestine, and died on her return. She was canonized in 1391. She had left, under the title 'Revelations,' a series of mystic writings, which, after due examination by the proper authorities, were pronounced inspired by Gregory XI. and Urban VI. These writings have been translated into Latin and French. The order of St. Bridget, called also sometimes that of St. Savior, or the Holy Saviour, continued in Sweden till the Reformation, and still includes some religious houses in Italy, Portugal, and other countries. Her youngest daughter, Catherine, was also canonized, and became the patron saint of Sweden.

Bridgeton, a city, port of entry, and county-seat of Cumberland County, N. J., on the Cohansey River, and on the New Jersey C. and the West Jersey & S. R.R.'s, 38 miles south of Philadelphia. It is a very old settlement, having been a place of considerable importance before the Revolutionary War. Its surroundings are agricultural, and it has manufactures of glass, gas-pipe, nails, machinery, flour, oil-cloth, woolen goods, shoes, and shirts, and also large fruit and vegetable canning interests. It has a public park, Tumbling Dam, which contains a picturesque lake and a fine field for athletics. The city contains the South Jersey Institute, the West Jersey Academy, Ivy Hall Seminary, Seven Gables Seminary, a public high school, two national banks, good water and sewerage systems, and electric lights and street railroads. Its excellent climate and scenic attractions have made the city a popular resort for summer tourists and residents. Pop. (1910) 14,209.

Bridgetown, the capital of the island of Barbados, in the West Indies. It extends along the shore of Carlisle Bay, on the southwest coast of the island, and is nearly two miles long, and about a half mile broad. On entering the port, its appearance is very pleasing, the houses being embosomed in trees, while hills of moderate height rise behind, studded with elegant villas. Many of the houses have balconies, painted in gay colors, which give them a lively and cheerful appearance. The town contains a handsome square, called Trafalgar Square, in which there is a bronze statue of Lord Nelson, placed there with great ceremony in 1813. The principal buildings include the Church of St. Michael, now the cathedral of the diocese; the Church of St.

Mary; the Jewish Synagogue; the Central School; Harrison's Free School; a handsome market-place; the barracks at the south extremity of the city; and the military hospitals. Bridgetown has been at several periods much damaged by fire. The last calamity of that kind occurred in 1845, when a large portion of the town was destroyed. Pop. over 21,000.

Bridgewater, Francis Egerton (THIRD DUKE OF), British nobleman: b. 1736; d. 8 March 1803. He was the youngest son of Scroop, fourth Earl and first Duke of Bridgewater, and succeeded his elder brother, the second Duke, in 1748. His estate of Worsley contained valuable coal mines, and with the view of establishing communication between these and Manchester, seven miles distant, he conceived the idea of a navigable canal. Having accidentally made the acquaintance of James Brindley, and perceived his great engineering talents, he employed him in the construction of this work, which, after encountering much opposition and ridicule, was at last triumphantly carried through. To the execution of this scheme the Duke devoted all his energies and fortune, restricting his expenditure for many years to £400 per annum.

Bridge-water, Francis Henry Egerton (EIGHTH EARL OF), English clergyman: b. London, 11 Nov. 1756; d. Paris, 11 Feb. 1829. He held several preferments in the English church, but his later years were spent in Paris, where he lived with a family of cats and dogs dressed as men and women, who accompanied him upon his drives. By his will he left \$40,000 to be invested in the public funds to be awarded to the author of the best treatise 'On the Power, Wisdom, and Goodness of God as Manifested in the Creation.' The selection of the author was left to Davies Gilbert, then president of the Royal Society, who decided to divide the sum among eight persons for as many treatises on various aspects of the theme. The Earl was the author of several scientific, historical, and other works, and bequeathed all his manuscripts to the British Museum with \$60,000 to keep up and extend the collection. See **BRIDGEWATER TREATISES**.

Bridgewater, or Bridgwater, a municipal borough and port, in the county of Somerset, England, on the Parret. Although the town is about 10 miles from the sea, vessels drawing 19 feet of water can come up to the quay at spring-tides; but great inconvenience is sometimes caused by the bore. The river divides the town into two parts, which are connected by an elegant iron bridge of one arch. The houses are generally well built, and chiefly of red brick. Among the chief buildings are the parish church (St. Mary Magdalene's), a handsome ancient structure, with a tower and spire; St. John's Church; the town hall, a handsome building in the Venetian style; corn exchange; borough jail; market-house; and custom-house. There is a free grammar school, an infirmary, and almshouses. A considerable shipping trade is carried on, chiefly coastwise. The tonnage entered and cleared annually is usually about 180,000 tons. The imports are timber, grain, coal, tallow, wine, esparto, linseed, etc.; exports, timber, bricks, etc. The chief manufacturing industry is that of bath-bricks which are made here (and indeed nowhere else) in great quantities. Ordinary bricks are also largely made, and

BRIDGEWATER—BRIDLE

there are engineering establishments, breweries, tanneries, foundries, oil-mills, etc. Bridgewater obtained its name, Burgh-Walter, from its having belonged to Walter de Douay, one of William the Conqueror's followers. In the civil war the inhabitants embraced the cause of Charles I., and defended the town resolutely against the Parliamentarians, but surrendered (1645) to Fairfax. In the castle built by King John, the Duke of Monmouth lodged, and was here proclaimed king in 1685, before the battle of Sedgemoor, which was fought about three miles from the town. Bridgewater then became the theatre of Feversham's and Jeffreys' barbarity. Up till 1870, when it was disfranchised for bribery, Bridgewater returned two members to Parliament.

Bridgewater, a town in Plymouth County, Mass., on the New York, N. H. & H. R.R., 27 miles south of Boston. It contains five villages and has a State normal school, the State Farm, State Almshouse, a public library, a savings bank, and manufactures of iron, nails, tacks, boots, shoes, and brick. Pop. (1910) 7,688.

Bridgewater Treatises, The, works which grew out of a singular contest in compliance with the terms of the will of the last Earl of Bridgewater, who died in 1829. He left \$40,000 to be paid to the author of the best treatise 'On the Power, Wisdom, and Goodness of God, as Manifested in the Creation.' The judges decided to divide the money among the authors of the eight following treatises: 'The Adaptation of External Nature to the Moral and Intellectual Constitution of Man,' by Dr. Thomas Chalmers (1833); 'Chemistry, Meteorology, and the Function of Digestion,' by William Prout (1834); 'History, Habits, and Instincts of Animals,' by William Kirby (1835); 'Geology and Mineralogy,' by Dean (William) Buckland (1836); 'The Hand . . . as Evincing Design,' by Sir Charles Bell (1833); 'The Adaptation of External Nature to the Physical Condition of Man,' by John Kidd, M.D. (1833); 'Astronomy and General Physics,' by William Whewell (1833); 'Animal and Vegetable Physiology,' by Peter Mark Roget (1834). All these essays were published as Tracts for the Times, and have had a great circulation and influence.

Bridge Whist. See WHIST.

Bridgman, Elijah Coleman, American missionary: b. Massachusetts, 1801; d. Shanghai, China, 1861. He graduated at Amherst College, 1826, and at Andover Theological Seminary, 1829, and immediately joined Dr. Morrison at Canton. He soon attained a wonderful mastery of the Chinese language, becoming in 1839 official interpreter to Imperial Commissioner Lin, and in 1844 interpreter and secretary to the United States Minister, Caleb Cushing. He founded 'The Chinese Repository,' a magazine of the greatest value and interest for all subjects relating to the Flowery Kingdom. He compiled a Chinese 'Chrestomathy' in the Canton dialect, a quarto volume of 734 pages, and the first practical manual of that dialect prepared in China.

Bridgman, Frederick Arthur, American artist: b. Tuskegee, Ala., 10 Nov. 1847. He studied at the Brooklyn Art School, and at the National Academy of Design, New York, and was a pupil of J. L. Gérôme, and at the Ecole

des Beaux-Arts, in Paris. In 1872 he went to Africa and began to paint subjects belonging to that part of the world, somewhat in the manner of Gérôme, but with a greater mastery in color. He has long resided in Paris, where he has exhibited his works with great success. He is noted for figure pieces and Oriental and archaeological pictures. Among his paintings are: 'An American Circus in Normandy'; 'L'Arabe'; 'Pharo'; and 'Burial of a Mummy,' which was awarded a prize at the Paris Exposition of 1878. He is a member of the National Academy of Design, New York, and a Chevalier of the Legion of Honor.

Bridgman, Herbert Lawrence, American journalist and explorer: b. Amherst, Mass., 1844. Graduating at Amherst College in 1866, he entered journalism and became associate editor of the Brooklyn *Standard Union*. In 1894 he accompanied and wrote an account of the Peary auxiliary expedition; in 1897 he was with Prof. Libbey of Princeton when the latter scaled the "Enchanted Mesa" of New Mexico; and in 1899 he commanded the Peary auxiliary expedition on the steamship *Diana*.

Bridgman, Laura Dewey, American blind deaf-mute: b. Hanover, N. H., 21 Dec. 1829; d. 24 May 1889. She was a bright, intelligent child, but at two years of age her sight, hearing, and smell were entirely destroyed by fever. Yet she learned to find her way about the house and neighborhood, and even to sew and to knit a little. In 1839 Dr. Samuel G. Howe, of Boston, undertook her care and education at the Perkins Institution. The first attempt was to give her a knowledge of arbitrary signs, by which she could interchange thoughts with others. Then she learned to read embossed letters by touch; next, embossed words were attached to different articles, and she learned to associate each word with its corresponding object. The next step was to procure her a set of metal types, with the letters cast at the ends, and a board with square holes for their insertion, so that they could be read by the finger. In six months she could write the names of most common objects, and in two years had made great bodily and mental improvement. Her touch grew in accuracy as its power increased; she learned to know people almost instantly by touch alone. In a year or two more she was able to receive lessons in geography, algebra, and history. She received and answered letters from all parts of the world, and was always employed, and, therefore, always happy. She learned to write a fair, legible hand, to read with great dexterity, to think and reason well, and at last became a teacher to others afflicted like herself. See her biography by Mary S. Lamson (1878).

Bridle, the headstall, bit, and reins, by which a horse is governed. It is an instrument of high antiquity. Pliny ascribes the invention of the bridle to Pelethronius, king of the Lapithæ. The first horsemen guided their horses with a rope or stick, and the sound of the voice. A cord drawn through the nose is sometimes used for other animals. The ancient Thessalian coins often represent a horse with a long rein trailing on the ground. The Romans were trained to fight without bridles, as an exercise in the manege. On Trajan's Column soldiers are thus represented at full speed. The parts of a modern bridle are the snaffle or bit; the head-

BRIDLINGTON — BRIEL

stall, or leathers from the top of the head to the rings of the bit; the fillet, over the forehead and under the foretop; the throat-band, which buttons under the throat; the reins; the nose-band, buckled under the cheeks; the trench, the cavesan, the martingal, and the chaff-halter.

Bridlington, or **Burlington**, a town of Yorkshire, England, incorporated in 1899. It is situated on a beautiful bay, 37 miles northeast from York, on the Hull and S. R.R., and consisting of one principal and several smaller streets. It is a favorite watering-place, with a fine harbor. The parish church forms part of an ancient priory of elegant architecture, but now much defaced. There are several Dissenting chapels and a free grammar school. A considerable trade is carried on in corn. Pop. about 15,000.

Bridport, a seaport and municipal borough, in Dorsetshire, England, lying between the rivers Bride, or Brit, and Asker, in a fertile valley surrounded by hills, 15 miles west from Dorchester and about 1½ miles from the sea. The Bride and Asker unite a little below the town, the united stream being called the Brit, and form a safe and commodious harbor for vessels not over 250 tons. Bridport consists mainly of three spacious streets, containing many well-built modern houses, chiefly of brick. In the centre of the town is the town hall and market-house, a handsome building in the Grecian style. The parish church of St. Mary's is a beautiful structure, cruciform, with a central tower, and contains a fine organ. At the northern entrance to the town is the more recent and less attractive St. Andrew's Church. There are, besides, several Dissenting chapels, schools, a library and scientific institute; and extensive manufactures of shoe-thread, ropes, cordage, sail-cloth, fishing-nets, etc. Bridport was a parliamentary borough from the reign of Edward I. to the passing of the Redistribution Act of 1885, when it was disfranchised. Pop. about 6,000.

Brie, **brê**, a former province of France, lying between the Seine and the Marne, and now contained in the departments of Aisne, Marne, and Seine-et-Marne. It was divided into Brie Française, which belonged to the government of Ile de France, and Brie Champenoise, which was divided into upper and lower Brie, and comprised in the government of Champagne. A third division once existed, called Brie Poilleuse; this was afterward incorporated with Brie Champenoise. The latter was the largest of the divisions, and had for its capital Meaux, the most important town in the whole province. Its chief wealth was in vineyards and pastures; and its butter and cheese acquired and still retain a wide celebrity. Brie Française produced grain in great abundance, and was likewise a good grazing country. In ancient times this province was partly covered by a vast forest, portions of which are still to be seen. It was subjugated by the Franks, who annexed it to the kingdom of Neustria. In the ninth century it was ruled by its own counts. One of these, having obtained the earldom of Troyes or Champagne, in 968, united the two provinces, which thenceforth shared the same fortunes. Both passed into the possession of the Crown in 1361.

Brief (from the Latin *brevis*, short), a brief or short statement or summary, particularly the summary of a client's case which the solicitor draws up for the instruction of counsel. In American practice a brief is an abridged statement of a party's case. It should give the names of the parties to the action, their residence and occupation, and tell the character in which they sue and are sued, and wherefore they prosecute or resist the action. It should contain an abridgement of all the pleadings; a chronological and methodical statement of the facts, in language easily understood; a summary of the questions in issue, and of the evidence which is to support each of the issues; the names of the witnesses by whom the facts are to be proved, or if there be written evidence, an abstract of such evidence; a description of the personal character of the witnesses, whether morally good or bad, whether they are naturally timid or over-zealous, firm or wavering, and the like. It should contain also a summary of the evidence of the opposite party, if known, and such facts as are adapted to oppose, confute, or repel it. The object of the brief is to inform the person who tries the case of the facts important for him to know. In some of the State courts and in the supreme court of the United States it is customary or requisite to prepare briefs of cases for the perusal of the court. These are usually printed. Briefs vary according to the purposes for which they are to be used. The points in a brief intended for the court should be printed in a bold, heavy-faced letter, although subordinate matter may be put in capitals, italics, and common type, according to its importance. A brief intended for the court must be in decorous language, and respectful to a judge from whose decision an appeal has been taken, and to the opposite party and counsel and all other persons named therein.

Brief, Papal, a pastoral letter in which the Pope gives his decision on some matter that concerns the party to whom it is addressed. The brief is an official document, but of less public character than the bull. It usually deals with matters comparatively private and subordinate, not, as the bull, with matters affecting the Church at large, or an entire nation. It is not signed by the Pope himself, but by an officer called "Il Segretario de' Brevi," and is sealed on red wax with the Pope's private seal, the fisherman's ring. Briefs are of two kinds: apostolical, those which issue from the Pope himself; and penitentiary, issuing from the office which bears that name.

Briel, **brêl**, or **Brielle**, **brê-ël'**, sometimes **The Brill**, a fortified seaport town on the north side of the Island of Voorne, near the mouth of the Meuse, in the province of South Holland, Netherlands. It contains a government arsenal and military magazines, and possesses a good harbor. The tower of St. Peter's Church serves as a lighthouse. Its male inhabitants are chiefly engaged as pilots and fishermen. Briel may be considered as the nucleus of the Dutch republic, having been taken from the Spaniards by William de la Marck in 1572. This event was the first act of open hostility to Philip II., and paved the way to the complete liberation of the country from a foreign yoke. The celebrated admirals De Witt and Van Tromp were natives of Briel. Pop. about 4,500.

BRIENNE — BRIGANDS

Brienne, brê-ên, John of, celebrated crusader: b. 1148; d. 1237. He was the son of Erard II., Count of Brienne; was present at the siege of Constantinople in 1204, and afterward, in 1209, married the granddaughter and heiress of Amaury, king of Jerusalem. Brienne thus obtained an empty title, and having been crowned at Tyre in 1210, defended himself, though with a very inferior force, against the attacks of the Saracens. The Emperor Frederick II., having engaged to join the crusade, provided the sovereignty of the Holy Land were ceded to him, Brienne abdicated in his favor, and gave him his eldest daughter, Yolande, in marriage. He afterward, in 1222, married Berengaria, sister of Ferdinand of Castile, as his second wife, and retired from the East; but the state of affairs there again brought him on the stage. He was crowned Emperor of the East in 1231, and continued to defend his dominions against all aggressors, more especially against the united forces of Vataces, emperor of Nicæa, and Azan, king of Bithynia.

Brienne, brê-ên, or **Brienne-le-Château**, lê-shâ-tô, or **Brienne-Napoléon**, na-pô-lê-ôn, a small town of France, department of Aube (Upper Champagne), about 23 miles northeast of Troyes, was the seat of the military academy at which Napoleon received his first instruction in the military art. **Brienne-le-Château** was afterward celebrated as the scene of a portion of the final struggle in 1814, in which the empire was overthrown, Napoleon being here defeated by the allies under Blücher.

Brienzen, brê-ên-ts, a town of Switzerland, in the canton of Bern, beautifully situated on a narrow ledge at the foot of the Bernese Alps, and on the northeast shore of the Lake of Brienzen. Its church, built in 1215, together with some old ruins and a handsome school, is finely situated on a height. Brienzen is noted for its cheese, and as the centre of the Oberland wood-carving industry. The Lake of Brienzen, one of the most picturesque in Switzerland, is formed by the river Aare, and discharges its water through the valley of Interlaken into Lake Thun, lying 24 feet below it. The lake has daily steamboat service between Brienzen and Interlaken, and by this route many tourists visit the famous Giessbach Fall.

Brier Creek, a small stream rising in Warren County, Ga., flowing southeast for about 100 miles, and entering the Savannah River a few miles east of Jacksonborough. It is noted for a battle during the Revolutionary War. After the American victory on Kettle Creek, in February 1779, Gen. Ashe was sent by Lincoln at the head of about 1,500 troops to drive the British from Augusta. The British, under command of Gen. Campbell, evacuated the city, retreated to Brier Creek, and after crossing destroyed the bridge. Ashe pursued them, arrived at the creek 27 February, and there, 3 March, he was surprised by 1,800 British under Gen. Prevost. The American troops were hastily called to arms, and as the British advanced opened upon them a heavy fire, but an unfortunate movement in their line gave the enemy an advantage which decided the fortune of the day. The Americans were put to flight, many were drowned in trying to swim the Savannah, or were lost in the swamps. Their total loss was about 200 killed and wounded, and as many

others taken prisoners. The British had only 5 killed and 11 wounded.

Brierley Hill, a market-town of Staffordshire, England, on the Stour, nine miles west of Birmingham. It has several churches, a town hall, and a free library. The district abounds in coal, ironstone, and clay. The inhabitants are mostly employed in the iron rolling-mills and boiler-works, and in the making of bricks, nails, chains, anchors, spades, glass, pottery, etc. Pop. about 12,000.

Brierly, Bob, the 'Ticket-of-Leave-Man,' in Tom Taylor's play of that name.

Brieuc, brê-ê, **Saint (Briocum)**, France, a town in the department of Côtes du Nord, about a mile above the mouth of the Gouët, in the Bay of Saint Brieuc. It is very poorly built, but contains an ancient cathedral, a diocesan seminary, a school of hydrography, and a library of over 20,000 volumes. Its port, in the village of Ligué, at the mouth of the river, admits vessels of 300 to 400 tons, and the town is engaged to some extent in the Newfoundland cod-fishery. On a height near it are the remains of the Tower of Cesson, which is visible 15 miles at sea. Pop. over 16,000.

Brig, a square-rigged vessel with two masts. The term is sometimes used as equivalent to brigantine, but modern American usage makes a difference. See **BRIGANTINE**.

Brigade, in general, an indeterminate number of regiments or squadrons. In the British army a brigade of infantry is generally composed of three regiments; a brigade of horse, of from 8 to 12 squadrons; and one of artillery, of five guns and a howitzer. A number of brigades form a division, and several divisions an army corps. A brigade-major is the chief of the brigade-staff. A brigadier-general commands a brigade. In the United States army three regiments of infantry or cavalry usually constitute a brigade, but there may be two regiments only, or more than three. The American brigade, like the British, is commanded by a brigadier-general. The brigade combination was introduced by Gustavus Adolphus, whose example was followed by Turenne, who formed brigades of 3,000 to 4,000 men. The use of the term in the French service is somewhat equivocal. In the gendarmerie, as formerly in the cavalry, a brigade is the small fraction of an army under the command of a subaltern officer. In the regular army a brigade now contains two or three regiments of infantry or cavalry, or else a mixed body.

Brigadier-General, a military officer of intermediate rank between a major-general and a colonel; the officer in the army of the United States who commands a brigade.

Brigandine, a piece of mediæval armor, consisting of thin jointed scales of plate, generally sewed upon linen or leather, the whole forming a coat or tunic.

Brigands, a name first given during the imprisonment of King John in Paris (1358) to the mercenaries who held the city, and whose misbehavior rendered them obnoxious. Froissart applied it to a kind of irregular foot soldiery, from whom it was transferred to simple robbers. It is now used especially of such of these as live in bands in secret mountain or forest retreats. In this sense the pest has been

BRIGANTES — BRIGGS

common to most countries, by whatever name the robbers may have been known—whether the escaped slaves and gladiators of Rome, the pre-Islamite brigands of Arabia, English outlaws and highwaymen, German robber nobles, the later banditti of Mediterranean countries and of Mexico, American stage-coach robbers, Australian bushrangers, or the dacoits and hill robbers of Asia. It has ever flourished under weak or corrupt governments, and patriotism at times has swelled its ranks, always largely recruited from those disposed readily to join in any political movement, and has transformed them into guerrilla companies, who have carried on a bitter warfare against the invader. Such Spanish bands harassed the French during the Peninsular war; in Italy the Austrian troops were frequently engaged in expeditions against the banditti led by the daring Bellino (*"Il Passatore"*), and in Greece the Klephts rendered brave and worthy service in the war of independence. In Cuba, in 1888, political discontent was made the excuse for the brigandage then rampant in the island, where four provinces were on this account declared in a state of siege. Religious persecution also has encouraged brigandage; in Bosnia, which has always produced the most perfect specimens of bandits, it was formerly very common, the unhappy Christians, who were reduced by the Turks to the condition of serfs, frequently taking to the mountains in despair, and then wreaking vengeance on their oppressors. Generally speaking, in countries with a notably scanty population, which is yet in many districts as notably overcrowded, brigandage will be found still in existence. Vigorous steps have been taken during the last 50 years to repress the practice, and in some countries with signal success. In Greece, organized companies of brigands, as distinguished from bands of highway robbers, fortuitously collected, have disappeared; and, in Italy, the chiefs with whom princes made treaties are found only in history. Nevertheless, brigandage is by no means obsolete. In Hungary, where it has flourished from time immemorial, and where even the free towns in the 15th century enrolled companies for organized rapine, and thus raised it to the height of an institution, it has found a stronghold in the shades of the Bakony Forest, whose swineherds are said to be in league with the bétars, and even to do an occasional stroke of business on their own account. In Sicily it is to be feared that this is still the only trade which really prospers in the island (see *MAFIA*); and the bands that infest the Turkish frontier are notoriously dangerous to the wayfaring merchant and the defenseless tourist. In 1887 special attention was attracted by the boldness of brigands in the Pyrenees, Tuscany, Servia, Macedonia, Asia Minor, and Mexico.

Brigantes, brī-găn'tēz, the name of the most powerful of the old British tribes, inhabiting the country between the Humber and the Roman wall.

Brig'antine, a sailing-vessel with two masts, the foremast rigged like a brig's, the mainmast rigged like a schooner's; also called "hermaphrodite brig." The term is applied to different kinds of vessels by mariners of different countries. The term "brigantine" was formerly applied to a light, flat, open vessel, with 10 or 15 oars on a side, furnished also with

sails, and able to carry upward of 100 men. The rowers, being also soldiers, had their muskets lying ready under the benches. Brigantines, being very fast sailers, were frequently made use of, especially in the Mediterranean, for the purpose of piracy, from which fact they derived their name.

Briggs, Charles Augustus, American clergyman and author: b. New York, 15 Jan. 1841. For a number of years he was pastor of the Presbyterian church at Roselle, N. J. In 1874 he was appointed professor of Hebrew in Union Theological Seminary, New York. He was tried for heresy in 1892, and was acquitted. In 1897 he formally severed his connection with the New York Presbytery and became a clergyman of the Protestant Episcopal Church. He is one of the foremost Biblical scholars in the world, and the Episcopal Church in this country might be searched in vain to find his equal as a teacher of Hebrew and the cognate languages and as an authority in that department of learning, or even one who is entitled to be put in the same class with him. Among his works are: 'American Presbyterianism' (1885); 'The Bible, the Church, and the Reason' (1892); 'The Higher Criticism of the Hexateuch' (1893); 'The Messiah of the Gospels' (1894); 'The Messiah of the Apostles' (1895).

Briggs, Charles Frederick, American author and journalist: b. Nantucket, Mass., 1804; d. Brooklyn, N. Y., 20 June 1877. Throughout his life he was engaged in journalism in New York, and under the pseudonym of **HARRY FRANCO** was widely known. In 1844 he founded the 'Broadway Journal,' and for a time Edgar Allen Poe was his associate editor. He was connected with 'Putnam's Magazine' (1853-6); the New York Times, the *Evening Mirror*, the Brooklyn Union, 1870-4, and the 'Independent.' Publications: 'Harry Franco; a Tale of the Great Panic' (1837); 'The Haunted Merchant' (1843); 'Working a Passage' (1844); 'Trippings of Tom Pepper' (1847); 'Seaweeds from the Shores of Nantucket' (1853); and in collaboration with Augustus Maverick, 'The Story of the Telegraph, and a History of the Great Atlantic Cable' (1858).

Briggs, George Nixon, American politician: b. Adams, Mass., 13 April 1796; d. Pittsfield, Mass., 12 Sept. 1861. He was governor of Massachusetts from 1844 to 1851, and one of the founders in that State of the Republican party. He spent one year at an academy, studied law, was admitted to the bar in 1818, and soon established a reputation as one of the best criminal lawyers in the State. From 1831-43 he was a representative in Congress, serving through one Congress as chairman of the Post-Office Committee. During his term as governor extraordinary efforts were made to induce him to pardon Prof. Webster, the murderer of Dr. Parkman, but he refused to interpose. For 16 years he was a trustee of Williams College, and at all times a noted advocate of temperance. His death was the result of an accident received from a gun. His life has been written by W. C. Richards under the title of 'Great in Goodness.' (1866).

Briggs, Henry, English mathematician: b. Warley Wood, Yorkshire, 1561; d. Oxford, 26 Jan. 1631. He entered St. John's College, Cambridge, and distinguished himself by his ac-

quirements in mathematics. In 1596 he was appointed first lecturer on geometry in the newly elected establishment of Gresham House or College, London, and in 1619 became in like manner first Savilian professor of geometry at Oxford. This professorship he held till his death. Briggs' great works are his '*Logarithmorum Chilias Prima*' (1617); '*Arithmetica Logarithmica*' (1624); '*Trigonometria Britannica*' (1633).

Briggs, Le Baron Russell, American educator: b. Salem, Mass., 11 Dec. 1855. He was graduated from Harvard University in 1875, was assistant professor of English there, 1885-90, and professor from 1890. Since 1891 he has been dean of the university. He has written '*Old Fashioned Views of Modern Education*'; '*Original Charades*'; '*School, College, and Character*.'

Brigham, brig'am, Amariah, American physician: b. New Marlborough, Mass., 26 Dec. 1798; d. Utica, N. Y., 8 Sept. 1849. He began practice at Enfield, Mass., about 1821, but soon removed to Greenfield, where he became widely known for his skill as a surgeon. In 1828 he went to Europe and spent a year studying in the hospitals. In 1831 he settled in Hartford, Conn., and in 1840 was appointed superintendent of the retreat for the insane there. Two years later he accepted a similar position at the State Lunatic Asylum, Utica, N. Y., where he remained till his death. He was a skilful business man, an able physician, and was frequently called to act as an expert in the courts. Publications: '*Treatise on Epidemic Cholera*' (1832); '*Influence of Mental Cultivation on the Health*' (1833); '*Influence of Religion upon the Health and Physical Welfare of Mankind*' (1835); '*Inquiry Concerning the Diseases and functions of the Brain, the Spinal Cord, and Nerves*' (1840); '*The Asylum Souvenir*' (1849); '*Mental Exertion in Relation to Health*' (1866). See C. E. Goodrich, '*Sermon on the Death of Amariah Brigham*' (1850).

Brigham, Sarah J. (LATHBURY), American illustrator and writer for young people: b. Manchester, N. Y., 1835. She was married to J. R. Brigham in 1854. She has written: '*Under Blue Skies*' (1886); '*Leopold and His Wheel*' (1896); '*The Pleasant Land of Play*' (1898); '*The Bond of Honor*.'

Brigham, William Tufts, American ethnologist: b. Boston, Mass., 24 May 1841. He was admitted to the Massachusetts bar in 1867, was for a year botanical instructor at Harvard and served for a time on the Boston school board. He removed to Honolulu in 1888, and has since been in charge of the Bishop Museum of Ethnology there. He has published: '*Cast Catalogue of Antique Sculpture*'; '*Guatemala, the Land of the Quetzal*'; '*Volcanic Manifestations in New England*.'

Bright, Charles, English civil engineer: b. London, 25 Dec. 1863. He is the youngest son of Sir Charles Tilston Bright, who laid the first Atlantic cable, and has been himself employed in cable-laying in many parts of the world, as well as on various surveying expeditions. He has published '*Science and Engineering During the Victorian Era*'; '*Submarine Telegraphs*'; '*Underground Cables*'; '*Ancient Methods of Signalling*'; '*The Evolution of the Electric Telegraph, 1837-97*'; '*The Life of Sir Charles*

Bright'; '*Imperial Free Trade*'; '*Imperial Telegraphy*.'

Bright, James Franck, English historical writer: b. London, 29 May 1832. He was educated at Rugby, and University College, Oxford, and was master at Marlborough College and head of the modern department there for 16 years. Since 1874 he has been dean of University College, and honorary Fellow of Bialiol from 1878. He has written '*History of England to 1880*'; '*Joseph II.*' (1897); '*Maria Theresa*' (1897).

Bright, Jesse D., American politician: b. Norwich, N. Y., 18 Dec. 1812; d. Baltimore, Md., 20 May 1875. He received an academic education, was admitted to the Indiana bar (1831), and became a circuit judge, State senator, and lieutenant-governor. From 1845 to 1857 he was a United States senator and president of the Senate during several sessions. Re-elected in 1857, he was expelled for alleged disloyalty, 5 Feb. 1862, the chief evidence against him being a letter addressed to "His Excellency, Jefferson Davis, President of the Confederation of States," recommending a friend who had an improvement in firearms to dispose of. Bright maintained that at the date of the letter (March 1861) he had no idea that there would be war, and wrote it to get rid of the inventor. Subsequently, he settled in Kentucky, and in 1866 was elected to the State Senate.

Bright, John, English statesman and orator: b. Greenbank, Rochdale, Lancashire, 16 Nov. 1811; d. 27 March 1889. His father, Jacob Bright, who belonged to a Quaker family originally connected with Wiltshire, migrated to Rochdale early in the century, and there established himself as a successful cotton-spinner and manufacturer. John Bright, who was the second of 10 children, was educated at Rochdale, Ackworth, York, and finally at Newton, near Clitheroe. At the age of 15 he entered the cotton-spinning business of his father, where, even at that early age, he showed much shrewdness and practical energy. Not satisfied, however, with merely mercantile affairs, he took an enthusiastic interest in such public questions as the abolition of slavery and the Reform Bill of 1831-2, while he diligently educated himself in public speaking at the debates of the Rochdale Literary and Philosophical Society. In 1835 he traveled in Greece, Egypt, and Palestine, and gave an account of the journey in a series of lectures delivered in his native town; but his career as a notable public speaker began with the free-trade movement. To relieve the pressure upon the working population of England occasioned by commercial depression and a bad harvest, it was proposed to cheapen bread by the repeal of the corn duty, and in an association formed for this purpose at Manchester in 1838 Mr. Bright was made a member of committee. In the following year this association, at a meeting in London, was widened into the famous Anti-Corn Law League, with Richard Cobden and John Bright as its two most prominent members. Yet it was not until after the death of his first wife, in 1841, that the latter put all his strength into the repeal campaign. In the autumn and winter of that year he organized branches of the League and addressed meetings in nearly all the large towns of England. It was inevitable that such a prom-

inent politician should find a place in Parliament, and accordingly, in 1843, he was elected as representative of the city of Durham. Having entered Parliament, he made his maiden speech in August of the same year on a motion in favor of carrying out the recommendations of the Import Duties Commission of 1840. Thereafter he seized every opportunity to press this question of repeal. The opposition from both of the great parties in the house was dogged, and the controversy might have lasted long but for the widespread sympathy occasioned by the Irish famine. In January 1846 Parliament was summoned, and Sir Robert Peel announced that his government was prepared to reduce and almost abolish the corn duties. This resolution was carried, but on the question of Irish coercion the government was defeated, and at the general election which followed (1847), John Bright was elected for Manchester. The corn duty question having been satisfactorily settled, he now turned his attention to such subjects as a reform in the affairs of Ireland and India, an extension of the suffrage, the adoption of voting by ballot, and the establishment of a national system of education. At the dissolution of Parliament in 1852 he was re-elected for Manchester, but by his strenuous denunciation of the Crimean war (1854), and his equally decided disapproval of the Chinese war (1856), he was rejected by his constituency at the general election of 1857. This result was made known to him at Florence, where he had retired to recruit after a serious illness, but the disappointment which it caused him was mitigated in a few months by his election for Birmingham, and in 1858 he returned to public life after an absence of two years. During the American Civil War he sturdily advocated the abolition of slavery, and gave his passionate adherence to the cause of the North, although as a Lancashire cotton-spinner his business suffered severely from a continuance of the struggle. About this time, also, his name became closely identified with reform in the electoral representation, and he had the satisfaction of seeing the principles for which he had contended embodied in the Reform Bill (1867) passed by Mr. Disraeli. He had no desire for office, but his presence in the cabinet councils of the Liberal party had now become so necessary that he was constrained to accept the presidency of the Board of Trade in Mr. Gladstone's government (1868), and in this position he gave powerful assistance in passing the act for the disestablishment of the Irish Church, the Irish Land Act, and the Elementary Education Act. Owing to ill health he retired from office in 1870, but re-entered the ministry as chancellor of the duchy of Lancaster in 1873. When the Liberal party returned to power in 1880 he again accepted this position, but two years later he found it necessary to resign because he disagreed with his colleagues on their Egyptian policy and the bombardment of Alexandria. At this time and for some years previously he had not appeared often upon public platforms, but in 1883 he delivered a notable speech when installed as lord rector of Glasgow University, and another in Birmingham in the same year when celebrating the 25th anniversary of his connection with that city. In 1886 he opposed the Home Rule Bill introduced by Mr. Gladstone, and until his death he strongly identified himself with the Unionist party in its efforts to defeat the Home Rule policy. This

opposition was weighted with the same characteristics which had secured his success in previous movements—a transparent sincerity of purpose which found its fearless exposition by pen and speech in direct, racy, idiomatic English. As an orator his platform manner was remarkable for its ease and unstudied simplicity; the richness and lucidity of his diction, abounding in happy epithets, often edged with irony or glancing with humor; a spirit of outspoken truthfulness breathing through all his utterances; while he was possessed of a voice which laid a spell upon his audience by its clear, round, sonorous fullness. Perhaps the most splendid expression of his sympathetic nature is found in the speeches in which he pleaded for justice to the oppressed populations whether in Ireland or India, while the same broad humanity, even more than the doctrines which were his Quaker birthright, animated his denunciations of war. He was a member of the Society of Friends, and was married first to a Miss Priestman, who died in 1841, and again to a Miss Leatham, who died suddenly in 1878. His life and speeches in two volumes were published in 1881 by G. Barnett Smith, and his public letters by H. J. Leech in 1885.

Bright, Richard, English physician: b. Bristol, 28 Sept. 1789; d. 16 Dec. 1858. He studied at Edinburgh, Berlin, and Vienna. His name is associated with Bright's disease (q.v.), he being the first who investigated its character.

Brightly, Frederick Charles, American lawyer: b. Bungay, England, 26 Aug. 1812; d. Germantown, Pa., 24 Jan. 1888. He came to the United States in 1831, and was admitted to the Philadelphia bar (1839). In 1870 he retired to devote himself to legal writing and compilation, for which he had pre-eminent gifts. His private law library of 5,000 volumes was one of the best collections in America. Publications: 'Law of Costs in Pennsylvania' (1847); 'Reports of Cases Decided by the Judges of the Supreme Court of Pennsylvania' (1851); 'Equitable Jurisdiction of the Courts of Pennsylvania' (1855); 'Analytical Digest of the Laws of the United States, 1789-1869' (1865-9); 'Digest of the Decisions of the Federal Courts' (1868-73); 'Bankrupt Law of the United States' (1871); 'Leading Cases on the Law of Elections' (1871); 'Digest of the Laws of Pennsylvania, 1700-1883' (1883); and other works.

Brighton (formerly **BRIGHTHELMSTONE**), a maritime town and favorite watering-place in England, county of Sussex, 50½ miles south of London. It is situated on a gentle slope, and is a clean and well-built town, with handsome streets, terraces, squares, etc., and a massive sea-wall, with a promenade and drive over three miles in length, one of the finest in Europe. The buildings of note are entirely modern, and not numerous. The most remarkable is the Pavilion, built by George IV. (then Prince of Wales), between 1787 and 1825. It cost upward of \$5,000,000. It is a building in the Oriental style of architecture, with a handsome stone front 300 feet in length, and a large Oriental dome 84 feet high in the centre. The Pavilion was discontinued as a royal residence by Queen Victoria in 1841, and was purchased of the Crown by the town of Brighton in 1850. Pop. about 125,000.

BRIGHT'S DISEASE — BRINTON

Bright's Disease. See KIDNEY.

Brigittines, or Order of Our Saviour, a branch of the Augustinians, founded about the year 1344 by Saint Bridget of Sweden, and approved by Urban V. in 1370. It owes its origin to the monastery built by Bridget at Wastein, near Linköping, in Sweden. It embraces both monks and nuns, who occupy contiguous buildings. The prioress is superior in temporal concerns, but spiritual matters are managed by the monks. All the houses of the order are subject to the bishop of the diocese, and no new one can be founded without express permission of the Pope. The number of male religious in each monastery was fixed by the rule at 25, and that of females at 60; but this regulation has ceased to be strictly enforced. Indeed, there are few establishments for both sexes now existing, though some are yet maintained in Germany, Flanders, and other countries; most of them, including the parent house at Wastein, were destroyed at the Reformation. There are two rich convents of Brigittines at Genoa, into one of which only ladies of high family are admitted. The only house of the order in England was the rich institution known as Sion house, founded by Henry V. on the Thames, 10 miles from London. It was one of the first suppressed by Henry VIII. After passing through the hands of the dukes of Somerset and Northumberland, it was restored to the religious by Queen Mary, and again dissolved under Elizabeth. The nuns then left England, and after various troubles established themselves in Portugal.

Bril, the name of two Dutch painters, (brothers), who distinguished themselves as landscape artists. (1) MATTHEW, b. Antwerp, 1550; d. 1584. When a very young man he went to Rome, and was so much esteemed by Gregory III. that he was employed on the galleries and salons of the Vatican. (2) PAUL, b. about 1556; d. about 1626. He was much superior to Matthew, and hearing of his success at Rome joined him there. The two brothers appear for some time to have worked together on the same pieces; but after Matthew's early death Paul was employed by Sixtus V., and executed six large paintings in his summer palace.

Brilliant. See DIAMOND.

Brimstone. See SULPHUR.

Brindisi, bren'dë-së, (ancient BRUNDISIUM), a seaport and fortified town in the province of Lecce in southern Italy, 45 miles east-northeast of Taranto. In ancient times Brundisium was one of the most important cities of Calabria. It was one of the chief cities of the Sallentines, and the excellence of its port and commanding situation in the Adriatic were among the chief inducements to the Romans to attack them. The Romans made it a naval station, and it was the scene of important operations in the war between Cæsar and Pompey. Virgil died here 19 B.C. On the fall of the western empire it declined in importance. In the 11th century it fell into the possession of the Normans, and became one of the chief ports of embarkation for the Crusades. Its importance as a seaport was subsequently completely lost, and its harbor blocked. In 1870 the Peninsular & Oriental Steam Navigation Company put on a weekly line of steamers between Brindisi and Alexandria, and Brindisi

is now an important station for passengers and mails to and from India and the East. There is also a trade with British, Austrian, and other ports. Latterly, the harbor accommodation has been considerably improved. The chief exports are wine, olive-oil, and figs; the chief import, coal.

Brindley, James, English engineer: b. Thornsett, Derbyshire, 1716; d. Turnhurst, Staffordshire, 30 Sept. 1772. At 17 he became apprentice to a millwright, and on the expiration of his indentures began business as an engineer, and in 1752 displayed great talent in contriving a water-engine for draining a coal-mine. Several important inventions introduced him to the patronage of the Duke of Bridgewater, then occupied in planning a communication between his estate at Worsley and the towns of Manchester and Liverpool by water. This immense work, ridiculed by scientific men of the period as impracticable, Brindley undertook and carried out by means of aqueducts over valleys, rivers, etc. The first portion of the Bridgewater Canal (to Manchester) was opened in 1661, the whole system being complete in the end of 1772. See Smiles, 'Lives of the Engineers' (1861-2).

Brine Shrimp, the only animal, except a species of fly (*Ephydra*), which lives in the Great Salt Lake of Utah. It is a phyllopod crustacean, with stalked eyes, a delicate, slender body, which is provided with 11 pairs of broad, paddle-like or leaf-like feet. It is about one quarter of an inch long. Similar forms live in brine vats in various parts of the world. *Artemia fertilis* abounds in Great Salt Lake. It may often be seen swimming about in pairs and has a nauplius young like that of the brine shrimp of Europe. It produces young by budding (parthenogenesis), as well as from eggs. A species observed near Odessa produced females alone in warm weather; and only in water of medium strength were males produced. The eggs of *A. fertilis* have been sent in moist mud from Utah to Munich, Germany, and specimens raised from the eggs by Siebold, proving the great vitality of the eggs of these Phyllopods, a fact paralleled by the similar vitality of the eggs of the king-crab. *A. gracilis* of Verrill has thus far only been found in tubs of concentrated salt water on railroad bridges in New England.

Brinjaree, brin'ja-rë. Dog, the East Indian greyhound.

Brin'ton, Daniel Garrison, American surgeon, archæologist and ethnologist: b. Thornbury, Pa., 13 May 1837; d. Atlantic City, N. J., 31 July 1899. During the Civil War he was a surgeon in the Union army, and from 1867 to 1887 was editor of the 'Medical and Surgical Reporter.' In 1884 he was appointed professor of ethnology at the Academy of Natural Sciences in Philadelphia; and, in 1886, professor of American linguistics and archæology in the University of Pennsylvania. Among his many works are notes on the 'Floridian Peninsula' (1859); 'The Myths of the New World' (1868); 'American Hero Myths' (1882); 'Aboriginal American Anthology'; 'Primer of Mayan Hieroglyphics' (1896); 'Religions of Primitive Peoples' (1897); etc. He edited 'The Library of Aboriginal American Literature' in eight volumes (1882-5), and was a high authority on all American archæological topics.

BRINTON — BRIQUETTE

Brinton, John Hill, American surgeon: b. Philadelphia, 1832. He graduated at the University of Pennsylvania (1850), and at the Jefferson Medical College (1852), serving through the Civil War as a surgeon. In 1882 he was appointed professor of the practice of surgery and clinical surgery at Jefferson Medical College. He has written 'Consolidated Statement of Gunshot Wounds' (1863); with J. H. Porter, 'History of the Organization of the Medical Department of the United States Army' (1864), a MS. in the surgeon-general's library at Washington; 'Description of a Valve at the Termination of the Right Spermatic Vein in the Vena Cava' (1856); 'Operative Surgery in General' (1881); 'The March of Surgery' (1882).

Brinvilliers, Marie Madeleine Marguerite d'Aubray, mã-rê mäd-lên mâr-gä-rêt dô-brä brän-ve-yä (MARQUISE DE), French poisoner: b. Paris, about 1630; executed 16 July 1676. She was the daughter of a civil-lieutenant of Paris, and married in 1651 the Marquis of Brinvilliers. About 1659 the Marquis introduced to his house a young cavalry officer, named Godin de Sainte-Croix, for whom his wife conceived a violent passion. The Marquis, occupied with his own pleasures, seemed indifferent, but her brothers remonstrated, and her father, scandalized at her misconduct, had Sainte-Croix openly arrested in her carriage and taken to the Bastille in 1665. Sainte-Croix remained in prison about a year, and made there the acquaintance of an Italian, who taught him the art of preparing poisons. On his liberation he imparted his discoveries to Madame de Brinvilliers, who had in the meantime assumed an air of piety, visiting the hospitals, and ministering to the sick, and had thus reconciled herself to her family; but the affront offered her by her father remained in her mind, and she had resolved to revenge it. Sainte-Croix, apparently from cupidity, seconded her design. He supplied her with poisons, with which she experimented first on the patients in the hospital. She occupied eight months in administering poison to her father, and at last killed him suddenly without being suspected. By the aid of Lachaussee, an old domestic of Sainte-Croix, whom she caused to enter their service, she also succeeded in poisoning her brothers. She is said to have attempted her husband, with a view to marry Sainte-Croix, but did not succeed. Sainte-Croix died suddenly, it is said from the falling off of a mask of glass which he used to protect himself in preparing a subtle poison. A packet addressed to Madame Brinvilliers, containing poisons labelled with descriptions of their effects, revealed their conspiracy. Among a number of letters there was one containing a promise of \$6,000, which Sainte-Croix had exacted as the price of his assistance. Madame Brinvilliers fled to Liège, and took refuge in a convent. Her extradition being obtained, she was inveigled from the convent by a pretended lover, brought to Paris, and on the evidence of Lachaussee, together with her own confession, condemned to be beheaded and afterward burned. See Pirot, 'La Marquise de Brinvilliers' (1883).

Brion, Friederike Elizabeth, frä-dër-ē'kē ā-lē'zā-bēt brē-ōn, German lady: b. Nieder-rödern, Alsace, 1752; d. 1813. To her Goethe dedicated several lyrics and she is the supposed

original of Maria, in 'Götz von Berlichingen,' as well as of other Goethean heroines. She figures in a well-known episode in Goethe's 'Dichtung und Wahrheit,' and is often styled from her place of residence, FRIEDRIKE VON SESENHEIM.

Brion, Gustave, French artist: b. Rothau, Alsace, 24 Oct. 1824; d. Paris, 4 Nov. 1877. He is noted for his Alsatian scenes and many of his works are to be found in American collections. Among them are: 'A Marriage in Alsace' and 'The Sixth Day of Creation.' He illustrated Hugo's 'Les Misérables' and 'Notre Dame de Paris.'

Brion, Luis, loo-ēs' brē-ōn', Colombian admiral: b. Curaçao, 6 July 1782; d. 20 Sept. 1821. He was sent at an early age to Holland to receive his education, his father being a native of that country, and there entered the Dutch army. He was offered a commission in 1799, but being recalled by his parents, returned to Curaçao. Receiving permission from his parents, he visited the United States, where he studied navigation. Upon the death of his father, who bequeathed him a large fortune, he bought a vessel and made several voyages; entering into speculation on his own account, he was very successful, and returned to Curaçao in 1804, where he established a mercantile house. The political events in Venezuela of 1808-10 brought Brion rapidly into notice; he volunteered his services to the republic of Caracas, and in 1811 was appointed captain of a frigate. He now devoted all his resources and his energies to the patriotic cause. At his own expense he fitted out a fleet of vessels, and attacked the Spanish forces at the island of Marguerite, where he gained a signal victory. Brion distinguished himself at the conquest of Guiana, and also at Santa Marta and Cartagena. During a residence at Savanilla he reduced the custom house duties; this coming to the ear of Bolivar, he directly countermanded the order, which so preyed upon the mind of Brion, that he became ill, and leaving the squadron returned to Curaçao, and soon died in poverty.

Briosco, Andrea, ān-drā'a brē-ōs'kō, Italian sculptor and architect: b. 1470; d. 1532. He designed the Church of Santa Giustina at Padua as well as a celebrated candelabrum in the Church of San Antonio there; and the Delle Torre tombs in San Ferno at Verona.

Brioude, brē-ood, a French town in the department of Haute Loire, capital of the arrondissement of the same name, situated near the left bank of the river Allier, on the site of the ancient town of Brivas. The old bridge at La Vieille Brioude, long celebrated as being the widest in span of any known, fell down in 1822. In the 16th century, many of the inhabitants of Brioude rose in favor of Lutheranism, but were afterward subdued by the Roman Catholic party. To Americans the town is of interest as the birthplace of Lafayette. A considerable traffic in grain, hemp, and wine is carried on here.

Brique, brē-kēt', the name, originally French ('small brick'), given to a comparatively new form of fuel, made mostly from waste coal dust, and used, not merely for household purposes, but in various industries.

BRISACH — BRISSAC

A briquette is simply an admixture of coal dust with pitch, molded under pressure and heat, the pitch or some similar substance being introduced to form the cementing material.

Brisach. See BREISACH, ALT.

Brisbane, brîz'bân, Sir Thomas Mac-Dougall, Scottish general and astronomer: b. Brisbane, near Largs, the seat of his family, 23 July 1773; d. there, 27 Jan. 1860. He entered the army and in 1793 took part in all the engagements of the campaign in Flanders. In 1796 he was sent to the West Indies, and in 1812 commanded a brigade under the Duke of Wellington in Spain. He took part in the battles of Vittoria, Orthes, and Toulouse, and received the thanks of Parliament for conspicuous bravery at the battle of the Nive. On the abdication of Napoleon he was sent to America. In 1821 he was appointed governor of New South Wales, which post he continued to occupy for four years. His administration was active and intelligent, and tended greatly to promote the prosperity of the colony. He introduced at his own expense a good breed of horses, and promoted the cultivation of the vine, as well as of sugar, cotton, and tobacco. At the same time he devoted himself with great diligence to the study of astronomy. He had an observatory erected at his residence of Paramatta, and catalogued 7,385 stars, until then scarcely known to astronomers. For this great work, known as the 'Brisbane Catalogue of Stars,' he received the Copley medal of the Royal Society. On his return to Scotland he devoted himself entirely to science. He had an astronomical, and later a magnetic observatory established at his residence at Makerstoun. The observations which he made there, with the aid of able assistants, fill three large volumes of the published 'Transactions' of the Royal Society of Edinburgh, of which he was president from the death of Sir Walter Scott. He founded two gold medals for scientific merit, one in the gift of the Royal Society, the other in that of the Society of Arts.

Brisbane, the capital of the colony of Queensland, Australia, on the Brisbane River, about 25 miles by water from its mouth in Moreton Bay, and about 500 miles north of Sydney. It was named in honor of Sir Thomas Brisbane (q.v.). Of the four parts into which the town is divided, North Brisbane is situated in the heart of the city, on the north bank of the river, and South Brisbane faces it on the south. Fortitude Valley is a large division on the north bank, to the east and northeast of North Brisbane, mostly situated on a peninsula formed by the winding of the river. The fourth division, Kangaroo Point, is on the south bank, comprising a point of land projecting between North Brisbane and the above peninsula. The streets are laid out as regularly as the tortuous course of the river will permit. The chief buildings are situated in North Brisbane, among them being Parliament House, where the legislature sits; Government House, in the Botanic Gardens; the government offices; the supreme court; the post-office; the technical college; the treasury buildings, a large structure of great architectural beauty; the old and the new town-hall; and the customs-house. Many of the banks have fine edifices, particularly the Queens-

land National Bank. The chief educational institutions are the Normal School, the boys' and girls' grammar schools, and the school of the Christian Brothers. Other buildings and institutions are the masonic and temperance halls; the School of Arts, with a good library; the museum; the Queensland Club; the large general hospital, and several special hospitals; an orphanage and a large jail in South Brisbane; the Opera House, one of the best theatres in Australia. The Victoria Bridge connects South with North Brisbane. It cost upward of \$555,000, and replaces an older one destroyed by a flood in 1893. It consists of six steel spans supported on five cast-iron cylinders filled with concrete, the abutments being of masonry and concrete; and the total length is about 1,041 feet. Much of the cross-river traffic is carried on by the ferries. The leading parks and gardens are the Botanic Gardens, with the Queen's Park, in North Brisbane, at the river-side, finely laid out; Victoria Park, to the north of North Brisbane; Albert Park, Mount Coot-tha, Bowen Park, and the gardens of the Acclimatization Society in Fortitude Valley; and Musgrave, Dutton, and Woolloongabba parks in South Brisbane. There is extensive wharf accommodation, and South Brisbane has a dry-dock. There is regular steamer connection with Sydney, London, and elsewhere, and adequate railway communication with Sydney and other chief towns in Australia. The climate is dry and healthy, but the temperature is often very high during the summer. Among the industrial establishments are a sugar-refinery, tobacco factories, flour-mills, etc. The trade is important, among the exports being gold, wool, sugar, etc. Originally founded as a penal settlement in 1825, Brisbane was incorporated in 1859. A United States consul is stationed here. Pop. about 145,000.

Briscoe, Margaret Sutton. See HOPKINS, MARGARET SUTTON BRISCOE.

Brise'is, a girl of Lyrnessus, called also HIPPODAMIA. When her country was taken by the Greeks, she fell to the share of Achilles in the division of the spoils. Agamemnon afterward took possession of her, and Achilles thereupon made a vow to absent himself from the field of battle at Troy. This incident Homer makes one of the chief features of his 'Iliad.'

Brisgau, brêz'gow, or **Breisgau**, a district of the grand-duchy of Baden, between the Rhine and the Black Forest, which, with the district of Ortenau, formerly constituted a land-graviate in the southwestern part of Swabia. This is one of the most fertile parts of Germany. Though chiefly in possession of Austria since the 15th century, it was governed by its own laws. At the Peace of Lunéville (1801) Austria ceded Brisgau, one of the oldest possessions of the House of Hapsburg, to the Duke of Modena, after whose death it fell to his son-in-law, the Archduke Ferdinand of Austria, as Duke of Brisgau. By the Peace of Presburg (1805) it was assigned to Baden, with the exception of a small part, and still belongs to the grand-duchy.

Brissac, brê-sâc, Count de. See COSSÉ, CHARLES DE.

Brisson, Barnabé, bar-na-bā brē-sōñ, French jurist: b. 1531; d. 15 Nov. 1591. Henry III. commissioned him to collect and edit the ordinances of his predecessors and his own, which appeared under the title 'Code de Henri III.' In 1589, he was made first president of the parliament, and after Henri's death, in August of the same year, proclaimed the Duke de Mayenne, the Chief of the League, lieutenant-general of the kingdom. Brisson soon after became suspected by the faction of the "Sixteen," who ruled in Paris, and who thought that he was favorable to Henri IV. He was accordingly arrested and summarily hanged. Among his works of importance are: 'De Verborum Quæ ad Jus Pertinent Significatione, etc.' (1557); 'Observationum Divini et Humani Juris Liber' (1564); 'De Formalis et Solemnibus Populi Romani Verbis, etc.' (1583), still in use; 'Opera Minora' (1606).

Brisson, Eugène Henri, è-zhān òn-rē, French politician and journalist: b. Bourges, 31 July 1835. He entered the chamber of deputies in 1871, and won much attention by urging amnesty for the Communists and other political offenders. Since then he has been one of the foremost members of the Radical party. He was elected president of the chamber in 1881, and retained that office until the overthrow of the Ferry ministry, in 1885, when he accepted the premiership. He was re-elected to the presidency of the chamber in 1894, and, in 1895, he retired from the ministry and was a conspicuous candidate for the presidency of France. In 1898 he again accepted the premiership, but his cabinet was soon overthrown. On 8 June 1906 he was elected president of the House.

Brisson, Mathurin Jacques, ma-too-rāñ zhāk, French savant: b. Fontenay-le-Comte, 30 April 1723; d. Versailles, 23 June 1806. He was instructor to the children of the royal family of France in physics and natural history. He was also censor royal, member of the Academy of Sciences, and of the Institute, and succeeded Nollet in the chair of natural philosophy at the College of Navarre. He translated Priestley's work on 'Electricity,' although he opposed his theories, and still more those of Franklin. The most able of his writings are on specific gravity and on ornithology. Buffon quotes frequently from Brisson's 'Ornithologia' (1760). He published in 1800 a 'Dictionnaire raisonné de physique.'

Brissot de Warville, Félix Saturnin, fā-lèks sà-toor-nāñ brē-sō dé vār-vèl, French animal painter: b. Sens, 1818. His paintings are renowned for their truthful representations of nature, their scenes being laid chiefly in Touraine and Normandy, or in the forests of Fontainebleau and Compiègne. Among them are: 'The Thicket' (1881); 'Return of the Flock' (1885); 'A Corner of the Sheepfold' (1888).

Brissot de Warville, Jean Pierre, zhōñ pē-ār brē-sō dé vār-vèl, French political writer, and one of the leaders of the Girondists: b. Ouarville, near Chartres, 14 Jan. 1754; executed, Paris, 30 Oct. 1793. He took the name D'Ouarville, which he afterward anglicized into De Warville, from the village of Ouarville, where he was born. He was designed for the law, and placed with a procurator in Paris; but early turned his attention to public affairs, asso-

ciating himself with such men as Pétion, Robespierre, Marat, etc. In 1780 he published his 'Théorie des Lois Criminelles,' and two years afterward an important collection called the 'Bibliothèque des Lois Criminelles.' During this period he edited for a time, at Boulogne-sur-Mer, the 'Courier de l'Europe', a translation from an English journal. He also visited England, where he endeavored to found a lyceum and establish a journal in connection with it. Failing in this enterprise, he returned to Paris, where his works had already classed him among the philanthropic theorists of the day. He was suspected of the authorship of an anonymous pamphlet, and thrown into the Bastille. On his liberation he engaged with Clavières and Mirabeau in some works on finance, which appeared under the name of the latter. Threatened with a new arrest, he escaped to England, and being there introduced to the Society for the Abolition of Negro Slavery, resolved to form a similar society in Paris. This society, which numbered many distinguished names among its members, and ultimately accomplished its object, he founded along with Clavières, Mirabeau, and others, and undertook a voyage to the United States to study on its behalf the problem of emancipation. On his return the Revolution was about to break out, and Brissot embraced it with ardor. He was not a member of the States-general, but was elected to the National Assembly for Paris and to the Convention for the department of the Eure et Loir. As leader of the Girondist party, his history belongs henceforward to the history of France. He voted, out of policy, for the death of Louis XVI., subject to confirmation by the vote of the people; and he caused war to be declared against Holland and England in February 1793. This was his last political act. Until the close of his career he was engaged in defending himself against the Montagnards. Brissot was inferior to Vergniaud as an orator, but his writings exercised a powerful influence on the Revolution. In the early part of his career his opinions were very extreme. In a passage, afterward used against him, he carried his advocacy of individual rights so far as to justify not only theft, but cannibalism. Proudhon was accused of having borrowed from him the maxim, "La propriété c'est le vol." His 'Mémoires pour servir à l'histoire de la Révolution' appeared in 1830.

Brissotins, brē-sō-tān. See GIRONDISTS.

Bristed, Charles Astor, American author: b. New York, 1820; d. Washington, D. C., 15 Jan. 1874. He was the son of the Rev. John Bristed, and grandson of John Jacob Astor, founder of the Astor Library. He graduated with high honors at Yale in 1839, and then spent five years at Trinity College, Cambridge, England, where he took a number of prizes and became a foundation scholar. He traveled extensively, and contributed many papers on light social topics and ephemeral subjects to the magazines of England and America. His wide culture and exact scholarship made his work attractive to all cultivated readers. He wrote 'Selections from Catullus' (1849); 'Letter to Horace Mann' (1850), a reply to certain attacks on Stephen Girard and J. J. Astor; 'The Upper Ten Thousand' (1852); 'Five Years in an English University' (1852), his most impor-

BRISTLE-TAILS—BRISTOL

tant book; 'Pieces of a Broken-Down Critic' (1857); 'Letter to Dr. Henry Halford Jones' (that is, Dr. J. G. Holland), editor of the Wintertown Democrat (that is, Springfield Republican), concerning his habit of giving Advice to Everybody and His Qualifications for the Task' (1864); 'The Interference Theory of Government' (1867). Most of his work was published, under the pseudonym of CARL BENSON.

Bristle-tails, wingless insects of the order *Thysanura*. These agile creatures have a long flattened body, with metallic scales, in form somewhat like those of butterflies. The antennæ are very long, setiform, many-jointed; the mouth-parts are free, with long palpi; the maxillary palpi being seven-jointed and the labial palpi four-jointed. The mandibles are stout, sunken in the head, and armed with teeth for gnawing. The prothorax is very large, and all the rings of the body are of much the same size, so that the insect bears a general resemblance to the myriapods. The anal stylets are long and large, which, with the smaller ones inserted on the subterminal rings of the abdomen, aid greatly in locomotion, though these insects run with great rapidity and do not leap like the *Poduridæ*, and thus remind us, as well as in their general appearance, of certain wingless cockroaches. Like cockroaches in one of its habits also is *Thermobia domestica*, which abounds in the chinks and crannies of the rouges of houses, and comes out at night, shunning the light. The «silver witch» (*Lepisma saccharina*) is not uncommon in old, damp houses, where it has the habits of the cockroach, eating cloths, tapestry, etc. In general form, *Lepisma* may be compared to the larva of *Perla*, a net-veined neuropterous insect. The body is long and narrow, covered with rather coarse scales, and ends in three many-jointed anal stylets, or bristles, which closely resemble the many-jointed antennæ, which are remarkably long and slender. They undergo no metamorphosis. Consult: Packard, 'Our Common Insects' (1873); Sharp, 'Insects' (1899).

Bristles, the stiff hairs which grow upon the back of the hog, and are used to a great extent in the manufacture of brushes. They are of several varieties of color and quality, distinguished as black, gray, yellow, white, and lilies. The last is the soft, silvery quality used for shaving-brushes. Russia and Germany are the chief sources of supply, but they are also obtained from France and Belgium, and large quantities of inferior quality have recently been received from China. The quality of bristles depends on the length, stiffness, color, and straightness—white being the most valuable. The best bristles are produced by hogs that inhabit cold countries.

Bris'tol, Augusta Cooper, American writer and lecturer: b. Croydon, N. H., 17 April 1835. She was State lecturer to the Patrons of Husbandry of New Jersey (1881-4), and is the author of 'Poems' (1868); 'The Relation of the Maternal Function to the Woman Intellect' (1876); 'The Philosophy of Art' (1880); 'The Present Phase of Woman's Advancement' (1880); 'Science as the Basis of Morality'; 'The Web of Life,' a collection of poems, (1895).

Bristol, Conn., a town in Hartford County, on the New England R.R., 17 miles west of Hartford. It has a public library, electric light and street railroad plants; national and savings banks; manufactories of clocks, brass goods, table ware, tools, bells, woolen and knit goods. It was incorporated as a borough in 1893. Pop. (1910) 9,527.

Bristol, a city of England, situated partly in Gloucestershire, partly in Somerset, but forming a county in itself. It stands on the confluence of the rivers Avon and Frome, whence the Avon pursues a course of nearly seven miles to the Severn. The Avon is a navigable river and the tide rises in it to a great height. Bristol is 118 miles due west from London, or two hours by rail. It stands partly on a number of eminences, partly on the lower ground at their foot. The manufacturing and business parts are on the lower levels, while the hills are now almost wholly covered with private houses. The districts of Clifton, Redland, and Cotham, situated within the limits of the borough and in the midst of charming scenery, are studded with mansions and villas, the attractions of these portions of the city being greatly increased by the Clifton and Durdham Downs. The bed of the river Avon is situated about 315 feet below the summit of Clifton Down, from which a handsome suspension bridge is thrown across the river, uniting the two counties. Its length from the centres of the piers is 703 feet, its height above high water mark 245 feet.

Area.—By the Boundaries Extension Bill of 1904 the city covered an area of 17,004 acres, and by 1910 had an estimated population of 377,642 with a ratable value of £1,820,683. As compared with the period of the Municipal Corporations Reform Act of 1835 when the area was increased from 755 to 4,461 acres, it will be seen that the size of the city has increased nearly fourfold in less than three-quarters of a century.

Geology.—The geological features of Bristol are of varied interest. Within a radius of five miles a complete series of rocks from the upper part of the old red sandstone to the top of the coal measures, and from the new red sandstone to the inferior oolite, is directly accessible to study in numerous quarries, and the fine cliffs of the Avon Gorge. The geology of Bristol may be studied in the 'Memoirs of the Geological Survey for 1876' in Sanders's Geological Map of Bristol, and in the Geological Survey Maps.

Churches, Hospitals, Etc.—Bristol is rich in ancient architecture, both ecclesiastical and domestic. The Cathedral, founded in 1142, was originally an abbey church. It exhibits various styles of architecture, the chapter house and its vestibule being Norman; the Lady chapel early English; the chancel and choir, the Berkeley and Newton chapels decorated; the groining of the transepts, the central tower, and cloisters perpendicular. The nave, its aisles, and western towers are modern additions, having been erected at intervals since 1865. There are several fine old churches, but they are all excelled by Saint Mary Redcliffe, perhaps the finest parish church in the kingdom. It is commonly said to have been founded by Simon de Burton, about 1293, but part of it is considerably older than this, and is believed to be

BRISTOL

as old as 1200. It is cruciform, with western tower and spire. The western door is the principal entrance, but there are also porches on the northern and southern sides. The south porch, the south transept, the tower, and much of the lower part of the church belong to the decorated style, and the north porch is an excellent specimen of it, the interior in particular being very beautiful. The remainder of the church, including the Clerestory, is of the Perpendicular Period. William Canynge, five times Mayor of Bristol, whose name is so prominent in the Chatterton controversy, is said to have restored this church about 1445-7. Other churches worthy of mention are Temple Church, with its leaning tower; Saint Stephen's, All-Saints', Saint Mary-le-Port, Saint Philip's, Saint James, and Saint John. Under the tower of this last church was one of the entrances to the ancient City of Bristol, and the gateway still exists. The Independents, Baptists, and Wesleyans have some noteworthy chapels. The Roman Catholics have a pro-Cathedral in Clifton, and several chapels and convents; altogether between 200 and 300 separate buildings in the city are dedicated to the cause of Christianity.

Saint Peter's Hospital adjacent to the church of Saint Peter, the seat of the poor law administration, is a very fine example of early domestic architecture. The buildings of various banks, and insurance offices in Corn street and Clare street are worthy of notice from a modern architectural point of view.

Libraries.—The most modern public building is the Bristol Central Library adjoining the Bristol Cathedral, completed in 1906, from designs by Mr. Percy Adams, F. R. I. B. A. A public library existed in Bristol early in the 15th century, and as no other record can be found of any such library prior to this in any part of England, the claim of the earliest in the kingdom must belong to Bristol. The Library was that of the Kalendarers, a brotherhood of clergy and laity who were attached to the Church of All-Hallows or All-Saints', still standing in Corn street. In 1613 the existing City Library was founded. Dr. Tobias Mathew, Archbishop of York at this time gave a number of books, to which he added subsequently a considerable portion of his library "for the free use of merchants and shopkeepers of the city." In 1740 the building still standing in King street was erected, minus the wing. In 1874 the Public Libraries Act was adopted and two years later the building was opened under the Act as the Bristol Central Library. The year 1906 saw the opening of the New Central Libraries in Cottage Green, a palatial building erected by the munificent bequest of a wealthy citizen, Mr. Vincent Stuckey Lean. The salient features of the historic King Street Library are preserved in this building in the "Bristol Library," an apartment exactly reproducing the original room in King street with the self-same old oak presses and wonderfully carved chimney piece of Grinling Gibbons. Here are shelved books dealing with the history of the city; the books of Archbishop Mathew, and other notable gifts of books by Bristol citizens, amongst them being the *Collectanea* of Proverbs, Folk lore, etc., collected by Mr. Vincent Stuckey Lean and presented to the city by

his executors. This collection is made accessible by means of an exhaustive catalogue compiled under the direction of the City Librarian of Bristol, Mr. E. R. Norris Mathews, F. R. Hist. S. F. R. S. L.; the early printed books and illuminated MSS. being separately catalogued. The public library movement in Bristol has advanced with rapid strides from small beginnings. The system is extended by means of commodious branches to all parts of the city, nine branches serving respective wards and circulating 750,672 volumes in the course of a year, whilst the various newsrooms and reading rooms are visited annually by a number of persons exceeding 2,500,000.

Art Galleries.—The Bristol Art Gallery was presented to the city by Sir William Henry Wills, now Lord Winterstoke. The building adjoins and communicates with the museum and was opened to the public in February, 1905. Internally a large and lofty top lighted central hall is surrounded by rooms on the ground floor devoted to the display of antiquities, a spacious marble staircase leads to picture galleries which form a splendid suite of communicating apartments.

Museum.—The Bristol Museum, originally a private proprietary institution, became the property of the citizens of Bristol in 1893. It is especially rich in objects illustrative of mineralogy, geology and palæontology; no less than 200 "types" and figured fossils are preserved here, described by such men as Agassiz, Riley, Stutchbury, Fitton, Huxley, Owen, and many others. The zoological collections are likewise of importance.

Electric Lighting.—The Bristol Corporation is responsible for the electric lighting of the city. The first instalment of public street lighting in 1893 consisted of 96 lamps, the total number now is 677 arc lamps. For private lighting purposes the demand has reached the total of 185,897 lamps. The use made of electricity for power purposes is increasing rapidly. The electric tramways of Bristol are controlled by a private company. The overhead trolley system is in use, and a service of motor cars has recently been instituted to connect the sections, and to open up outlying districts.

Industries, Etc.—Bristol has long been famous for its glass works, potteries, soap works, tanneries, tobacco factories, chocolate factories, and chemical works, as well as for ship building and machinery yards. Coal is found and worked extensively within the limits of the borough. Bristol carries on an export and import trade with all parts of the world. Cereals and flour are the most important imports, others being cheese, butter, bacon, cattle, sugar, timber, petroleum, hides. The total value of imports and exports is about \$12,000,000. The total tonnage entered and cleared at Bristol in 1909 was 1,474,199. The present dock system comprises a dock of 19 acres at Avonmouth on the Gloucestershire bank of the Avon, and of 12 acres (deep water area) at Portishead on the Somerset bank of the river, two miles below Avonmouth; and a floating harbor of 70 acres in the heart of the city. The latest enterprise in dock construction is that of the Royal Edward Dock at Avonmouth which covers an area of 30 acres, and provides accommodation for vessels much larger than

BRISTOL

any afloat. The first sod was cut on 5 March 1902; it was opened in 1908. The depth of water on the inner sill is at mean spring tides 40 feet and at mean neap tides 30 feet. The length of the dock is 1,120 feet and the width 1,000 feet. The entrance lock is 875 feet long, and 100 feet wide. On each side are piers at which steamers land mails and passengers, who reach London over an almost straight line in 2½ hours. Bristol traders colonized Newfoundland and established commerce with the West Indies and the American colonies. The city has long been known for its ship building interests, and the Great Western, the first steamship to cross the Atlantic, was built at Bristol in 1838. A United States Consulate is stationed here.

Education.—The principal institution for the higher education is the University College, opened in 1876, and having a medical school attached to it. A movement is on foot to make it the central seat of learning for the West and South of England with the power of conferring degrees. The university claims the honor of being the first to open its door to women students.

The Grammar School dates from pre-Reformation days. In 1532 it was endowed by Robert and Nicholas Thorne. The Cathedral School likewise dates back to the Reformation, it being part of the Cathedral Corporation established by Henry VIII. in 1538. The City School, or Queen Elizabeth's Hospital for boys, was founded in 1586, and owes its existence to John Carr, a wealthy Bristol citizen. The Red Maids School for girls is the foundation of Alderman Whitson by bequest in 1627. The Clifton College, opened in 1862, has for many years ranked high as an English Public School. The College buildings and grounds occupy a large area East of Clifton Downs. The Merchant Venturers' Technical College was originally a trade school. In 1875 the endowed schools commissioners appointed the Society of Merchant Venturers as trustees. The building—a monument to the liberality of that society—was almost totally destroyed by fire in October 1906, and is now in course of re-erection. Other educational establishments are: The Clifton, and the Redland High Schools for girls; Clergy Daughters' School; about 45 Council schools directed by the education committee of the Bristol Corporation, inclusive of three higher grade and science schools; a day industrial school; a school for cookery; truant school; and an institution for the deaf and dumb. The Congregationalists erected in 1906 a commodious college building at Cotham for the training of students for the ministry.

Charity.—The charitable institutions of Bristol are so numerous and of such importance that adequate mention of them here is impossible. The invested funds devoted to charitable work yield a revenue exceeding \$300,000 per annum, which sum supports almshouses, asylums, homes, and schools, and provides for pensions and gifts of all descriptions. The name most familiar in a long list of benefactors is that of Edward Colston, whose name is handed down to successive generations by three great commemorative societies instituted to perpetuate his grand philanthropy. These societies are instrumental in raising funds by voluntary

subscriptions amounting to upwards of \$15,000 per annum. The charities, formerly regulated by the Corporation, are now by decree of the Charity Commissioners, administered by trustees. The Merchant Venturers' Society, which, as early as the 7th year of Edward IV., claimed to be an ancient guild, has endowed and supports others, whilst denominational bodies are mainly responsible for the remainder, one of the most remarkable being the Ashley Down Orphanages, founded in 1836 by the Rev. George Müller.

Government.—The city is governed by a Council consisting of 22 aldermen, and 66 councillors, the former being elected for a term of six years, and the latter for a term of three years, agreeably with the provisions of the Municipal Corporations Act. The Mayoral list of Bristol extends in unbroken sequence from the year 1216, when the King (Henry III.) with his counsellors and tutors came to Bristol as to a safe place, at which time he permitted the town to choose a Mayor after the manner of London. In June, 1899, or more than 600 years after the institution of the office, Queen Victoria was graciously pleased to direct that the Mayor of the City of Bristol should in future bear the style and title of Lord Mayor.

History.—The Celtic name of Bristol was *Caer Oder*, or the City of the Chasm (namely, through which the Avon flows). The name Bristol is derived from the Anglo-Saxon *bricg*, a bridge, and *stow*, a place. It was early a place of commerce. Between 1239 and 1247 a new channel was dug from the Frome in order to provide better accommodation for shipping. In the reign of Edward II. Bristol rebelled against the royal authority and was held by the citizens against the sovereign for four years. In 1373 it was constituted a county of itself, by Edward III. It was made the seat of a bishopric by Henry VIII. in 1542. During the Civil War between Charles I. and the Parliament it declared in favor of the latter, but was stormed and taken by the Royalists under Prince Rupert. After the battle of Naseby it was taken by Fairfax, and its formidable castle was razed to the ground. In 1831 the Reform agitation gave origin to riots that lasted for several days. The rioters destroyed various public and private buildings, among which was the bishop's palace, and a number of them lost their lives. Bristol was united as a bishop's see to Gloucester in 1837. The first bishop of Bristol and Gloucester united was James Henry Monk, created in 1837. By the Bristol Bishopric Act Bristol was again separated from Gloucester, and Dr. Forrest Browne was enthroned, 28 Oct. 1897. Sabastian Cabot, Chatterton, and Southey were natives of Bristol. The city returns four members to Parliament.

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E. R. NORRIS MATHEWS,
L. ACKLAND TAYLOR.

BRISTOL—BRITAIN

Bristol, N. H., a town in Grafton County, 32 miles north from Concord. It is at the junction of the Pemigewasset and New Found rivers; is the terminus of the Bristol branch of the Boston & M. R.R., and has become a place of summer resort. It has a public library, and flannel, wooden ware, and paper manufactories. Pop. (1910) 1,478.

Bristol, Pa., a borough in Bucks County on the Delaware River, the Pennsylvania R.R. and the Pennsylvania Canal; 21 miles northeast of Philadelphia. It has a national bank, high school, electric light and street railroad plants, a noted mineral spring, and manufactories of carpets, hosiery, and foundry products. It is in a rich fruit and truck farming region, and is the centre of considerable trade. It was originally called Buckingham, and was settled in 1681. A ferry connects it with the town of Burlington on the New Jersey side of the Delaware. Pop. (1910) 9,256.

Bristol, R. I., a town and county-seat of Bristol County, on Narraganset Bay, and the New York, N. H. & H. R.R., 15 miles southeast of Providence. It has an excellent harbor, facilitating a large daily passenger and freight service for Fall River and Providence. It is the seat of the widely known Herreshoff ship-building works, where a number of noteworthy sailing and steam yachts and torpedo boats have been constructed; and also of the Saunders & West yacht-building yards. The town has a handsome brown stone library building containing some 15,000 volumes, eight churches, 17 public schools, large market gardening and coast trade interests, and manufactories of rubber, woolen, and cotton goods. Bristol is the site of the residence of King Philip, the great Narraganset chief. Pop. (1910) 8,565.

Bristol, Tenn. and Va., a city in Sullivan County, Tenn., and Washington County, Va., incorporated 1856. Its location on the State line, with the population being about equally divided between these two States, has necessitated two separate municipal governments, each conforming to the State Constitution under which it exists. Otherwise Bristol is in reality one city. The city is a terminal point for five railroads, the connections forming trunk lines in three directions. These roads have brought Bristol in touch with the rich mineral and timber resources of that region, especially the iron and coal deposits. To develop these resources, Bristol has become the headquarters of a number of companies, the largest of which is the Virginia Iron, Coal and Coke Company. Bristol has five banks, 25 wholesale mercantile houses, 95 manufacturing plants, its principal industries including iron, lumber, barytes, belting leather, tanning extract, paper, pulp, flour, foundry and car shops. Its business aggregates \$16,000,000 annually. There are one weekly, one semi-weekly, and two daily newspapers; two colleges for women, one for men, and one for colored people. Its churches represent practically all denominations. Pop. (1910) 13,395.

J. B. PETERS,
Gen. Manager and Secretary, Board of Trade.

Bristol Bay, an arm of Bering Sea, lying immediately to the north of the peninsula of Alaska. It receives the waters of two large

lakes, by which communication with the interior is opened up for a considerable distance.

Bristol Brick, or **Bath Brick**, a kind of brick used for cleaning steel, manufactured for some years exclusively in Bridgewater and Bristol, England. A small vein of the sand required for this purpose was found near Liverpool, but was soon exhausted. One of the owners or operatives, who had been concerned in the works at Bristol, visited the United States in 1820, where by accident he discovered that the same kind of sand which was used for the Bristol bricks might be procured at South Hampton, N. H. Since that period, bricks fully equal to the imported article have been manufactured in this country.

Bristol Channel, an arm of the Irish Sea, extending between the southern shores of Wales and the western peninsula of England, and terminating in the estuary of the Severn. It is about 90 miles long, and from 15 to 50 miles wide. It is remarkable for its high tides and the rapidity with which they rise. At Chepstow spring-tides rise as high as 60 feet. On its coast are situated the towns of Cardiff, Swansea, Ilfracombe, Tenby, etc. It receives the waters of the Usk, Severn, Wye, Avon, Parrott, Taw, and Torridge rivers. At the entrance of the channel is Lundy Island.

Bristow, Benjamin Helm, American lawyer: b. Elkton, Ky., 20 June 1832; d. 22 June 1896. He was admitted to the bar in Kentucky in 1853. He served with distinction in the Civil War, and at its close was appointed United States district attorney of Kentucky. In 1874 he became secretary of the treasury, and made his name memorable by the exposure and prosecution of a notorious whiskey ring. He removed to New York in 1876, and had an extensive legal practice there.

Bristow, George Frederick, American musician: b. Brooklyn, N. Y., 1825; d. New York, 1898. From 1851 to 1862 he was the conductor of the New York Philharmonic Society, and later of the Mendelssohn Union. The greater part of his life was spent as an organist in the churches, and as a teacher in the public schools of New York. He wrote 'Rip Van Winkle,' an opera produced in New York 1855; 'Daniel,' an oratorio (1867); 'Arcadian Symphony' (1874); and 'The Great Republic,' a cantata (1880).

Bristow, Joseph L., American politician: b. Flemingsburg, Ky., 1859. He was educated for the ministry, but became editor of the Salina, Kan., *Republican*, and soon after entered politics. He was secretary of the Republican State Committee in 1896, and in 1898 was appointed fourth assistant postmaster-general. In 1900 he became active in exposing frauds in the post-office department.

Bris'tow Station, now **Bristoe, Va.**, a village in Prince William County, four miles southwest of Manassas Junction. On 27 Aug. 1862 a drawn battle took place here between the Federal army under Gen. Hooker, and a Confederate one under Gen. Early, and on 14 Oct. 1863, the Federal troops under Gen. Warren repulsed with severe loss a Confederate attack under Gen. A. P. Hill.

Britain. See GREAT BRITAIN.

Britain, Ecclesiastical History of, by the Venerable Bede, or Bæda (673-735). Bede was

BRITAIN—BRITISH ASS'N. FOR THE ADVANCEMENT OF SCIENCE

by far the most learned Englishman of his time; one of the greatest writers known to English literature; in a very high sense "the Father of English History"; an extensive compiler for English use from the writings of the Fathers of the Church; an author of treatises representing the existing knowledge of science; and a famous English translator of Scripture. A recent authority calls him "the greatest name in the ancient literature of England"; and Green's 'History' says of him: "First among English scholars, first among English theologians, first among English historians, it is in the monk of Jarrow that English literature strikes its roots. In the 600 scholars who gathered round him for instruction, he is the father of our national education." It was in point of view and name only that Bede's great work was an ecclesiastical history. It covered all the facts drawn from Roman writers, from native chronicles and biographies, from records and public documents, and from oral and written accounts by his contemporaries. It was written in Latin; first printed at Strasburg about 1473; King Alfred translated it into Anglo-Saxon; and it has had several editions and English versions in recent times.

Britain, New. See NEW BRITAIN.

Britannia, the ancient name of Britain. Under the name of Britannia, Great Britain is personified as a helmeted woman seated on a globe or an insulated rock, leaning with one arm on a shield, and the other grasping a spear or trident.

Britannia Metal, an alloy that has come into very general use in modern times, many domestic utensils, such as spoons and teapots, being made of it. Such articles are commonly electro-plated, and made to resemble real silver. It consists chiefly of tin and antimony, but often contains also a small quantity of copper, zinc, and bismuth. A common proportion is 140 parts of tin, three of copper, and nine of antimony; but the best alloy is composed of 90 parts of tin and 10 of antimony. The copper is used mainly to impart color to the combination. The manufacture of the metal was introduced into England about 1770. Queen's metal is one of the varieties of Britannia metal.

Britannia Tubular Bridge, an iron tubular bridge across Menai Strait, which separates Anglesea from Wales, about one mile from the Menai suspension bridge. It has two principal spans of 460 feet each over the water, and two smaller ones of 230 feet each over the land; constructed 1846-50. See BRIDGE.

Britannicus, the son of the Roman emperor, Claudius, by Messalina: b. about 42 A.D.; poisoned 55 A.D. He was passed over by his father for the son of his new wife Agrippina. This son became the Emperor Nero, whose fears that he might be displaced by the natural successor of the late emperor caused him to murder Britannicus.

British America, the general name for the whole northern part of the North American continent beyond the territory of the United States. It extends from lat. 41° to 78° N., and from lon. 52° to 141° W. The frontier line between British America and the United States was determined by the conventions of 1830 and 1846. It is bounded east by the Atlantic Ocean, Davis Strait, and Baffin Bay; north by the

Arctic Ocean; northwest by Alaska; west by the Pacific Ocean; and south by the United States. In its broadest sense British America includes Upper and Lower Canada, the Hudson Bay, and Northwestern territories, Nova Scotia, Newfoundland, Cape Breton, Prince Edward Island, and New Brunswick, with Vancouver Island in the Pacific, but all British possessions on or near the American continent. Each of these will be treated under its own title.

British Association for the Advancement of Science, a society first organized in 1831, mainly through the exertions of Sir David Brewster. Its first meeting was held at York, 27 Sept. 1831. Its objects are thus described in the preamble to the rules of the association: "To give a stronger impulse and a more systematic direction to scientific inquiry; to promote the intercourse of those who cultivate science in different parts of the British empire with one another and with foreign philosophers; to obtain a more general attention to the objects of science and a removal of any disadvantages of a public kind which impede its progress." The second meeting took place at Oxford in 1832, under the presidency of Dr. Buckland, and since then a meeting has been held every year up to the present. All the principal towns of the United Kingdom have on one or more occasions formed the place of rendezvous, a different locality being chosen every year. In 1884 the meeting took place at Montreal, in 1897 at Toronto, and in 1902, the 72d annual meeting was held in Belfast, Ireland. The meeting for 1903 will be held at Southport and that for 1904 at Cambridge. The sittings extend generally over about a week. The society is divided into sections, which, after the president's address, meet separately during the sittings for the reading of papers and conference. Soirees, conversazioni, lectures, and other general meetings are usually held each evening during the meeting of the association. The sections are: A. Mathematics and Physics; B. Chemistry; C. Geology; D. Zoology; E. Geography; F. Economic Science and Statistics; G. Mechanical Science; H. Anthropology; I. Physiology; K. Botany; and L. Educational Science. Local committees are formed to arrange for meetings, etc. The important national benefits conferred by the labors of various members of the association have long been duly recognized. Among these may be mentioned more especially the experiments on electricity and magnetism which have achieved such important consequences in the establishment of the electric telegraph and a more thorough knowledge of the laws which govern the weather and other meteorological phenomena. In mechanical science also the labors of members of the British Association have been productive of the most important results. As the funds which the society collects at each meeting are more than sufficient to cover its expenses, it is enabled each year to make direct grants for the pursuit of particular scientific inquiries, which otherwise could not be conducted so efficiently, if at all; but besides this direct encouragement, its indirect influence on the promotion of science is undoubtedly great in many ways. Among the presidents of the association have been many distinguished men, including Dr. Whewell (1841), the Earl of Rosse (1843), Sir John Herschel (1845), Sir R. Murchison (1846), Sir

BRITISH CENTRAL AFRICA PROTECTORATE—BRITISH COLUMBIA

David Brewster (1850), Sir George Airy (1851), Sir Richard Owen (1858), Prince Consort (1859), Lord Armstrong (1863), Sir Charles Lyell (1864), Sir J. D. Hooker (1868), T. H. Huxley (1870), Lord Kelvin (1871), J. Tyndall (1874), Sir John Lubbock (1881), Lord Rayleigh (1884), Lord Playfair (1885), Sir William Huggins (1891), Sir A. Geikie (1892), and Sir W. Crookes (1898).

British Central Africa Protectorate, The, a portion of British Central Africa, lying around the shores of Lake Nyassa, and extending to the banks of the Zambezi. It includes all British Nyassaland, as well as the Shire Highlands, and the greater part of the basin of the river Shire. The expenses of administering the Protectorate are partly met out of revenue locally raised, and further by an annual grant from the Imperial government. The administration is in the hands of a commissioner acting under the foreign office. The port of British Central Africa is Chinde, at the mouth of the Zambesi, where a small concession has been granted by the Portuguese government. The area of the Protectorate is about 40,000 square miles; the European inhabitants number about 500, and the native inhabitants are about 850,000.

The principal occupation of the European settlers is planting; and many thriving plantations of coffee, sugar, cinchona, and tobacco have been established. Ivory, tea, ground nuts, and rubber are also raised. The principal imports are soft goods, provisions and hardware. The chief towns, Blantyre, Zomba, Fort Johnston (the principal port on Lake Nyassa, and naval depot), Karonga (north end of Lake Nyassa) the starting point for Tanganyika, and Kotakota (west coast of Lake Nyassa). The Protectorate is divided into 12 districts, managed by a number of collectors and assistant collectors, judicial officers, etc. There is at least one judicial officer, and in some cases two or three, in each district. Almost the entire trade of British Central Africa is with the United Kingdom.

On Lake Nyassa there are seven steamers, and twenty steamers on the Zambesi and Shiré rivers. A railway, 113 miles in length now connects Port Herald with Blantyre, and will probably be extended to Lake Nyassa. The Protectorate is connected by telegraph overland with the Cape; and, with the Portuguese rivers, to Chinde and Quilimane. The African Trans-Continental Telegraph Company's line has now been extended northward as far as Ujiji on Lake Tanganyika.

Bibliography.—Scott Keltie, 'The Partition of Africa' (1895); Deele, 'Three Years in Savage Africa' (1897); Johnson, 'British Central Africa' (1897).

British Columbia, the most westerly province of the Dominion of Canada, lies on the Pacific Ocean, and has a series of coast-line fiords or passages unexcelled on any shore in the world. The Province extends from south to north from lat. 49° N. to lat. 60° N. Its eastern boundary follows the crest of the Rocky Mountains as far as 55° N. and then follows lon. 120° W. up to lon. 60° N. British Columbia has an area of some 383,000 square miles, being thus more than three times the extent of the British Isles.

Climate.—The climate of British Columbia is as varied as the terrane. The Japan current

on the Pacific Ocean acts in the same way as the Gulf Stream on the Atlantic, and makes a mild, though at certain seasons a very wet, climate. The writer has seen roses blooming in the garden at Christmas in Victoria. But the damp breezes from the Pacific Ocean having deposited their moisture on the west slope of the Coast Range pass over eastward as dry Chinook winds, so that 150 miles from the coast regions are found the Okanagan and Thompson River valleys where irrigation is required. As water is plentiful on the mountain slopes, fruit growing is carried on successfully in this irrigated region. Every variety of climate is thus obtainable in British Columbia, from the humid flats of the Pacific islands to the dry plains of the interior, and then to the icy cold and perpetual snow of the Rocky Mountain slopes. The valleys thus grow cereals in some parts, on the lower lands luxuriant grasses, and fruit of every kind in many places. The climate of Victoria, on Vancouver Island, has the balmy and delightful sweetness of the Lotus-Eaters' land.

Physical Geography and Mining.—The greater part of British Columbia is made up of mountains, including the Rockies and Selkirks on the east and the Coast and Island ranges on the west, with an average height of about 8,000 feet. To the west of the great ranges there is a wide and elevated plateau in which is to be found chief agricultural areas. From and through these great mountains run a variety of large rivers—the Columbia, the Fraser, the Skeena, the Stikine, the Liard and the Peace. Naturally the initial resources and development of such a region would be minerals, timber, fish and similar products. The total mineral products of the province up to and including 1911 has been \$397,696,722. The first gold production was in the placer-mining period from 1862 onward, when the banks of the "golden" Fraser and other creeks or rivers yielded some \$50,000,000. Then commenced (about 1895) the serious lode mining which is now running into \$5,000,000 yearly. The total production of placer and lode gold up to the end of 1911 was \$137,175,683; that of silver, \$32,053,895; of lead, \$25,715,126; of copper, \$65,315,049; of coal and coke, \$122,084,343; and of other minerals, \$15,352,000. The total production of the mines in 1895 was \$1,266,954; in 1900 it was \$4,732,105; in 1911 it was \$23,499,072.

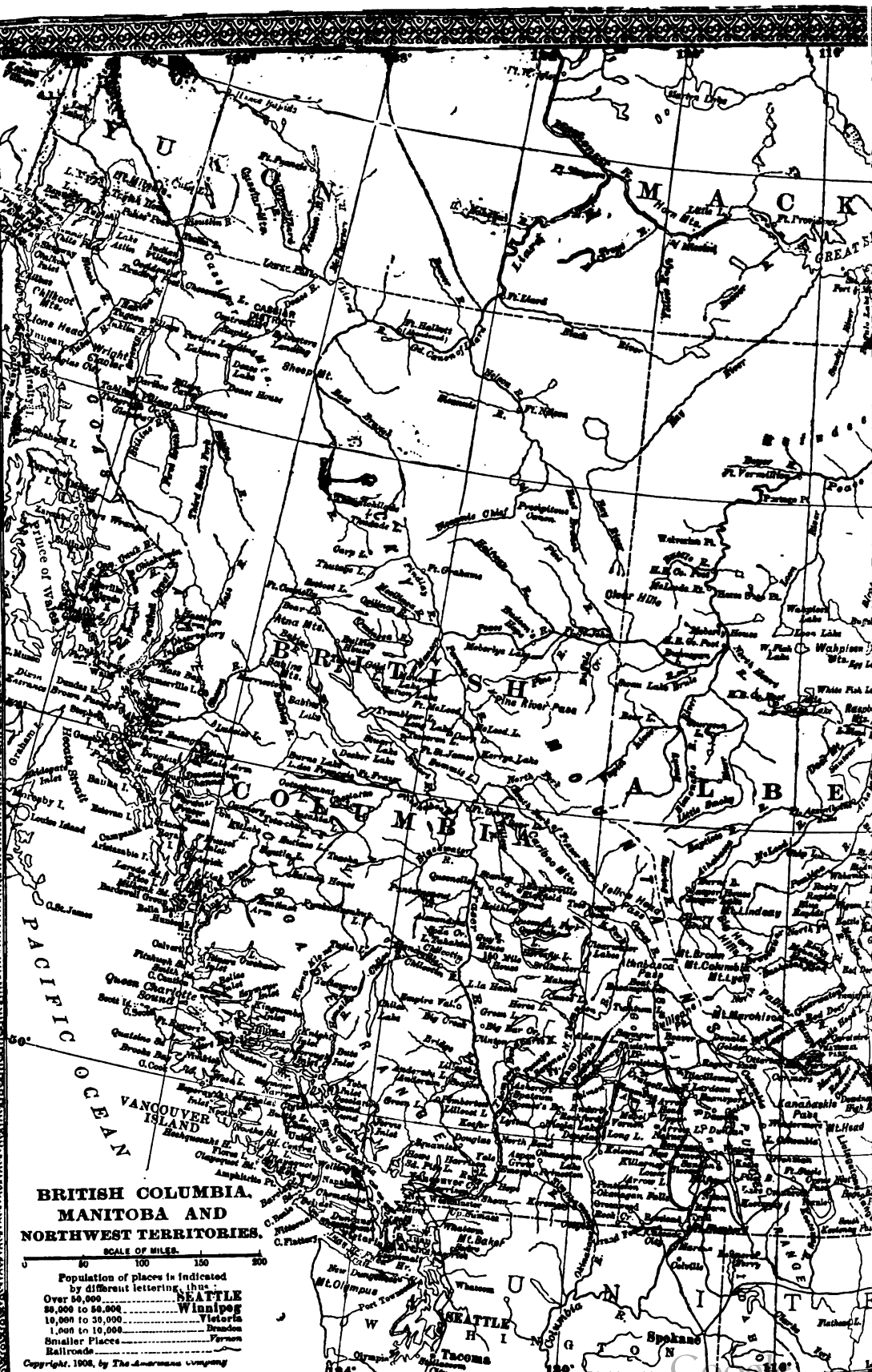
The country is divided into districts. Kootenay has an area of 15,000,000 acres and contains a large amount of agricultural land requiring, however, irrigation. The name is synonymous with the idea of mineral wealth and its mountains are rich in gold, silver, coal, lead and copper. In the last few years a number of towns have grown up around and in connection with these mines—Revelstoke, Nelson, Kaslo, Rossland, Trail, New Denver, Sandon, Slocan City, Fernie, etc. Yale has about the same area and includes the rich valleys of the Okanagan, the Nicola, the Similkameen and the Kettle River country. It has large cattle ranges and fruit farms as well as the Boundary mineral region. Lillooet contains some 10,000,000 acres, is bisected by the Fraser River, and well adapted for cattle raising and dairying. Big game is common and there is still some placer mining. Westminster is about half the size of Lillooet and includes the Fraser River valley, which

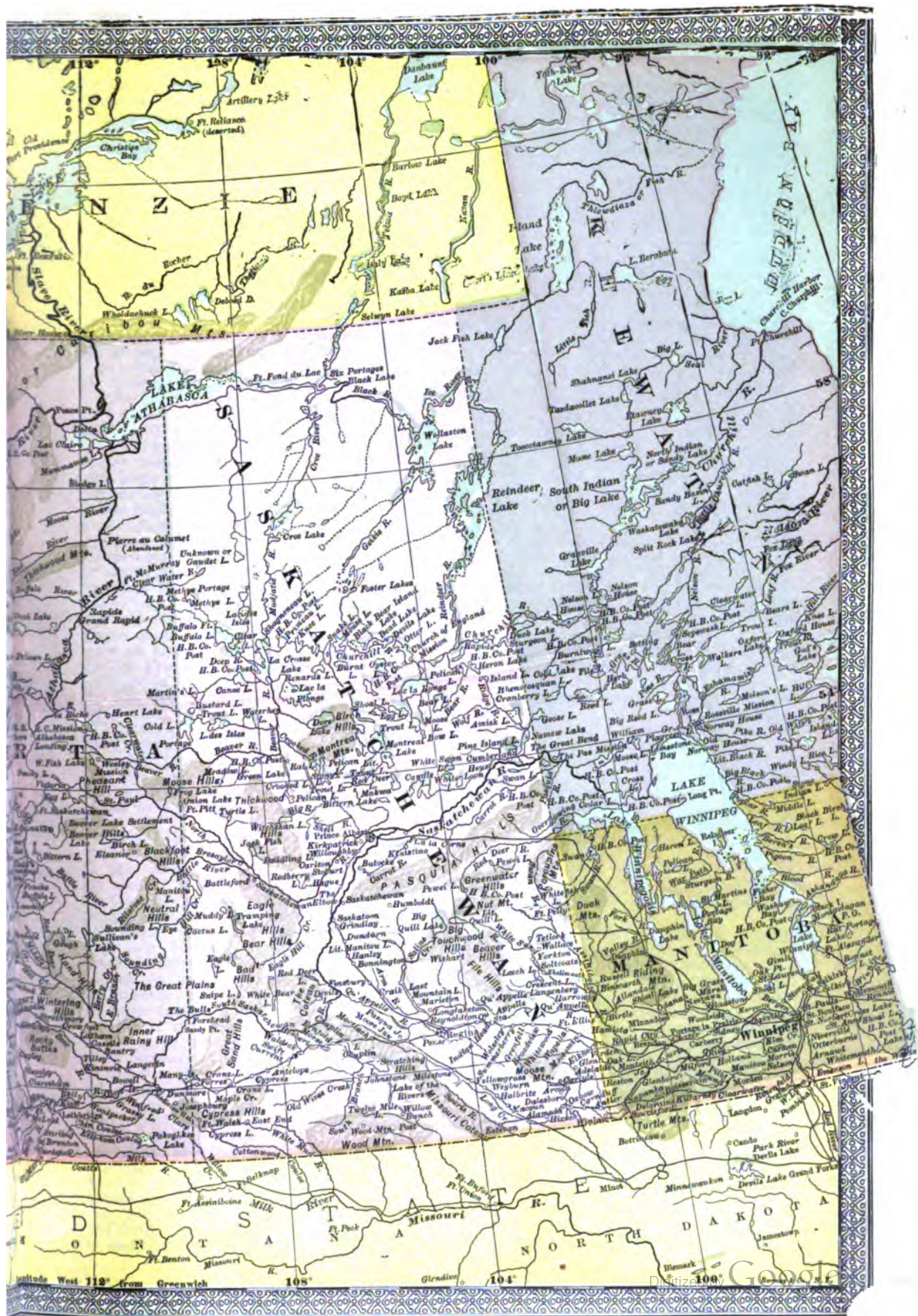
BRITISH COLUMBIA. MANITOBA AND NORTHWEST TERRITORIES.

SCALE OF MILES.

Population of places is indicated
by different lettering, thus:
Over 50,000.....**SEATTLE**
25,000 to 50,000.....**Winnipeg**
10,000 to 25,000.....**Victoria**
1,000 to 10,000.....**Brandon**
Smaller Places.....**Fernon**
Railroads.....

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BRITISH COLUMBIA

has the second largest compact area of agricultural land in the province. Lumbering is an important industry and salmon-canning its best known business. Cariboo has about 93,000,000 acres and was the centre of the great placer mining excitement of the sixties, when so much gold was taken out of its creeks. Hydraulic enterprises are in process of development and a dozen or more companies are now operating upon a large scale. Cassiar has 105,000,000 acres and is largely unexplored. There have been gold discoveries in late years in Omenica, in the vicinity of Dease Lake, and recently in the Atlin country. Comox includes the northern part of Vancouver Island and contains the chief logging camps of the Province. It is rich in timbers, fish, minerals and agricultural land, though as yet, very sparsely populated. This latter description, outside of Victoria and its vicinity, will apply to the whole of Vancouver Island. The gross output of Provincial collieries in 1911 was 2,259,067 tons.

Lumber.—The timber resources of British Columbia are enormous and include birch, hemlock, cedar, maple, oak, spruce, and pine. The trees are large in size and the Douglas pine is, in particular, an important native product. Up to 1871 the lumber cut of the Province was estimated at 250,000,000 feet, and from 1871 to 1888 at 595,000,000 feet. In the latter year there were 25 saw-mills with an area under lease of 135,063 acres, and a lumber cut of 31,868,884 feet; in 1898 there were 45 saw-mills with a leased area of 1,576,000 acres, and a cut of 124,546,658 feet; in 1910 there were 225 mills, an area under special license of 9,000,000 acres, and a product of 1,040,000,000 feet, with a net revenue to the Province of \$2,000,000. The shipments abroad in 1902 were 57,121,435 feet, while in 1911 the two great milling concerns—the Hastings and the Chemainus saw-mills—shipped a total of \$64,556,000 feet, worth \$900,000. The chief subject of complaint for some years past in connection with the lumber industry has been the United States duty of \$2.00 per 1,000 feet which Canadian concerns have to face while their own markets are free to American dealers.

Fisheries.—The fisheries of the Province are also extensive and resourceful. For various reasons the salmon industry has not been a growing one of late years. In 1896 the yield was 601,570 cases; in 1897 it reached the point of 1,015,477 cases; in 1901 the production was 1,236,156 cases; in 1904 it was only 465,849 cases; in 1910, however, it was 762,201 cases. The waters of British Columbia teem with many other kinds of fish, including halibut, black-cod, the solachan, cod and bass, sturgeon, shad, oil-fish, white fish and trout. The total value of the yield of its fisheries between 1876–1909 was \$128,355,112; the yield in 1910 alone was valued at \$9,000,000. In this connection the sealing industry has a greater place in international discussion than it holds in local production. From 1871 to 1903 the total result of Canadian pelagic sealing was 798,109 seal skins. The number of seals killed in 1883 was 9,195; in 1893, 70,592; in 1903, 20,496; in 1908, 4,954.

Miscellaneous Affairs of the Province.—The imports of the Province in 1905 were \$12,565,019 and in 1910 \$27,001,010. The exports were respectively, \$16,677,882 and \$25,068,411. The revenues of British Columbia in 1902–3 were \$2,044,630, and the net expenditure \$3,393,182. In

1909–10 they were respectively \$8,874,741 and \$6,382,993. Between 1904 and 1910 the total revenues were \$29,927,791, and the expenditures \$21,298,544. The provincial liabilities on 31 March 1910, were \$9,616,800, incurred largely in the development period of a country whose riches had not been made easily accessible by nature. The area of British Columbia is, in acres, 236,922,177, the number of houses, according to the census of 1901, was 36,938, the families, 38,445, the population being 178,657. As to origin, 104,589 were English, Irish or Scotch, 25,488 were Indian and 19,482 Chinese or Japanese. There were 10,088 persons classed as "American" in the Province, and 17,164 who had been born in the United States. The Church of England had 40,669 adherents, there were 25,047 Methodists, 34,081 Presbyterians, 33,639 Roman Catholics, and 10,027 Buddhists. The rural and urban populations were almost equal; the commercial census total for 1911 is 292,480. The chief railway is, of course, the Canadian Pacific Railway, with various branch lines, but the Grand Trunk Pacific is under construction east from Prince Rupert; the Great Northern of the United States has already reached Vancouver, and the Canadian Northern expects to cross the mountains to the coast by 1914. Other and small lines are under construction or being actively promoted. The total product of the Province in 1911 was as follows: Manufactures, \$45,000,000; mining, \$23,000,000; timber, \$24,823,000; agriculture, \$20,837,893; fisheries, \$11,000,000. The total was \$124,660,893 as compared with \$100,742,000 in 1910 and \$51,800,000 in 1904.

Early History and the Hudson's Bay Company.—When Sir Francis Drake sailed up and down the Pacific coast of North America in 1578–9 and took possession of what is now the State of California, in the name of Queen Elizabeth, he is said to have sailed as far north as the entrance of the Strait of Juan de Fuca. In 1592 the Spaniard whose name is borne by those straits entered them and sailed a good distance up the Strait of Georgia, between Vancouver Island and the mainland of British Columbia. Juan Perez, another Spaniard, in 1774 and Behring, the Danish navigator, in 1748, touched at points of this territory. But it remained for Captain Cook in 1778, under instructions from the British government, to really explore its coasts and give names to places since well known to history.

Other explorers followed—Hanna, Meares, Portlock, Dixon, Haro, Duncan and Barkley—until in 1792 Captain George Vancouver came with instructions to carry out a thorough survey of the intricate coast lines of the future province. After this period, for many years, Great Britain ceased to show any interest in the country. To the aggressive, enterprising traders of the Hudson's Bay Company was due the fact that the British flag was kept flying at all and that it was not eventually replaced by that of the United States, as in Oregon and Washington. In this connection the arrival of the company's steamer *Beaver* by way of Cape Horn, in 1835, marked an important era in the history of the province. Of the overland explorers the chief were Sir Alexander Mackenzie, 1793, Lewis and Clark, 1804–6, Thompson in 1807, Simon Fraser in 1808, the Astor expedition of 1810–11. From this time until the middle of the 19th century the history of what was

BRITISH COLUMBIA

then called New Caledonia is a record of Hudson's Bay fur-trading, occasional international or inter-company disputes, the building of dozens of forts, the maintenance of law and order amongst the Indians. Exclusive trading privileges were given the company in 1838, Alaska was leased by it in 1839, the Oregon boundary was fixed in 1846, and Vancouver Island was ceded in 1848 for a brief period.

Gold Discoveries and Early Constitutional History.—In 1858 a rumor reached San Francisco that gold had been found in the Fraser River. A party left at once for that region and the result of their success was a stampede from the Pacific coast city to the golden banks of the Fraser. The Horsefly discoveries and the rich bars of the Quesnelle, were the next attractions. In 1861, the celebrated Williams' Creek was found and turned out to be one of the richest discoveries of the kind in history. Many claims paid dividends of from \$20,000 to \$60,000 a year, and all its diggings paid well. One claim of 300 feet of ground produced \$300,000. For a time the placer mines of Cariboo repeated the history of California in 1849, and then came a gradual exhaustion, not, however, before some \$50,000,000 worth of gold had been extracted.

Meanwhile, and up to 1849, the government of Vancouver's Island and the mainland of New Caledonia had been that of the great fur-trading company under its royal charter of 1670. In 1849, however, special terms were made with the company as to Vancouver Island and it was declared a crown colony. A governor was appointed with a council of seven members and with authority to call an assembly elected by the inhabitants. This legislature, which first met in 1856, had full power to impose taxes and regulate affairs subject to and with the final assent of the governor. Mr. R. Blanshard was the first holder of this post, but from 1851 to 1856 the practical ruler of the country was Mr. (afterwards Sir) James Douglas, a man of remarkable character and capacity, and who combined in himself the functions of chief factor of the Hudson's Bay Company with those of acting—and from 1856 to 1864 actual—representative of the crown. On 17 Nov. 1866 the mainland, which was now known as British Columbia and had been under separate government since 1858, was united with Vancouver Island. The first legislature of the united province met in Victoria in 1868, though, as yet, it was only partially elective in composition.

Confederation with Canada.—During this period the British colonies on the Atlantic and on the great lakes of British America had combined in 1867, after prolonged agitation, in a confederated system. Ambitious extension had brought them, in 1869-70, the rights and territory of the Hudson's Bay Company in Rupert's Land and the western prairies. Further and greater ambition was expressed in current expectation of a transcontinental line to the Pacific coast. At this point British Columbia came into consideration. Isolated behind an apparently insuperable barrier of great mountain ranges and with vast plains stretching for 800 miles between those mountains and the outposts of Canadian civilization, union was a dream without the prospect of a railway. With it the subject became practicable.

After much discussion of the subject throughout the province, the passing of resolutions by the provincial legislature and prolonged consideration at Ottawa the terms of union agreed upon included six members in the House of Commons and three in the Senate; construction, to be commenced by the Dominion within two years, of a railway connecting eastern Canada with the Pacific coast; a land grant from the province to the Dominion government through the entire extent of British Columbia for the railway and not to exceed 20 miles on either side of the line; payment in return of \$100,000 per annum to the province for the use of these lands; assumption by the Dominion of the charge of the Indians and their lands; complete responsible government and an entirely elective assembly to be established in the province whenever desired by the people. In November 1870 a provincial election was held and the terms of union approved. The new legislature met on 5 Jan. 1871, the proposals were unanimously ratified and, on 20 Jan. 1872, British Columbia entered confederation. The constitution was then re-organized upon a popular basis and in 1871, the elections under the new system took place.

Later Political Events.—Hon. J. W. Trutch was appointed the first lieutenant-governor and Hon. J. F. McCreight the first premier. Succeeding prime ministers were Amor de Cosmos, G. A. Walkem, A. C. Elliott, J. Walkem, Robert Beaven, Wm. Smithe, A. E. B. Davie, John Robson, Theodore Davie, J. H. Turner, C. A. Semlin, Joseph Martin, James Dunsmuir, E. G. Prior and Richard McBride. Following the entry into confederation came prolonged and at one time acute differences with the Ottawa government over the non-completion of the Canadian Pacific Railway. For some eight years, while that great undertaking was in the struggling stages of inception and preliminary construction, the discontent in the province was very great. There were even threats of secession and talk of annexation to the United States. Meantime, however, construction went on slowly and surveys continuously. The imperial authorities were complained to and missions came from Eastern Canada and others went to London. Finally, Lord Carnarvon, as colonial secretary, suggested terms of settlement which were agreed to by both parties and which involved the construction and completion of the Canadian Pacific Railway by 1 Jan. 1891. It was completed in 1885. A visit of Lord Dufferin, as governor-general, to the coast in 1876 had, meantime, done much to smooth asperities and promote the settlement of this vexed and vital question.

Government.—British Columbia has a lieutenant-governor appointed by the Dominion government. The supreme court has a chief justice and four judges. There are six county court judges. The province is represented in the Dominion Parliament by three senators and seven members of the House of Commons. The local legislature consists of one chamber of 42 members. Victoria is the capital of the province. Its government building is among the finest in Canada.

J. CASTELL HOPKINS,
Author of 'Canadian Annual Review of Public Affairs.'

BRITISH EAST AFRICA—BRITISH EMPIRE

British East Africa, a name defining a vast district lying between German East Africa and the Italian protectorate of Somaliland. Its area is vaguely estimated to be over 1,000,000 square miles. The territory contains the valley of the Upper Nile and the mountainous region of equatorial Africa. The inhabitants comprise Bantu tribes, among which are the Waganda and Wangoro, Musai, and Galla tribes, Swahili on the coast, and negroes on the Nile. Ivory, gum, India rubber, sesame seeds, coconuts, copra, coir maize, rice, and hides are exported. The government is principally vested in the British East African Protectorate, but in 1894, Uganda (q.v.), north of Victoria Nyanza, was made a separate British protectorate and received a separate administration. The government is rapidly opening up the country, constructing roads and telegraphs, and taking steps to suppress slavery and the slave trade. The coast is unhealthy for Europeans, but most of the interior plateaus are salubrious. The British East African Protectorate extends for about 400 miles along the north coast from Umba at the mouth of the Umba River and has a total area of about 300,000 square miles. See EAST AFRICA, BRITISH; EAST AFRICA PROTECTORATE.

British Economic Association, a society established in London in 1890 with the design of advancing economic investigations through the medium of a quarterly styled 'The Economic Journal.' This periodical is the most valuable one of its class and is open to the expression of very diverse views upon economic questions. Viscount Goschen has been the president of the association from its founding. It gives an annual dinner in London, but holds no regular scientific meetings.

British Empire, the aggregation of states, dependencies, and controls which is subject in the last resort to the British Parliament. Officially it was not entitled to the name till 1876, when Queen Victoria assumed the title Empress of India; but the term was in current use long before. It is the largest body of land and of people under any one jurisdiction on the globe, comprising about one fourth of the earth's surface, and of its inhabitants: over 11,500,000 square miles, exclusive of Egypt, and Egyptian Sudan, or 12,500,000 with them, and 400,000,000 population. Extensive portions of it lie in each of the five grand divisions of the globe: about 121,000 square miles in Europe, 3,700,000 in America, 1,865,000 in Asia, 2,700,000 in Africa, 3,175,000 in Australasia. Its organization is entirely different from that of any other "empire" in history. The control of the central government over the outlying sections varies from its autocracy to their virtual independence; the most valuable parts are the least controlled, and have become the most valuable largely by that freedom. None of them pay any taxes into the imperial treasury, and the mother country derives her profit from them solely through trade relations, and as furnishing employment for the overflow of British youth. Indeed, movements for independence are forestalled by the concession of whatever privileges are claimed by the self-governing dependencies, even to the imposition of discriminating duties on British goods; and it is a postulate of British politics that no

forcible resistance shall be offered if any of these wishes to withdraw altogether.

The nucleus of the empire is the United Kingdom of Great Britain and Ireland, ruled nominally by a hereditary sovereign; actually by a parliament with one chamber popularly elected and the other composed of hereditary peers. Even the latter in practice always yields to the popular house when that body is firmly set on a given policy.

The subordinate portions fall under six classes: (1) Wholly self-governing communities: their sole ties to the mother country being an ornamental governor whose real functions are social and argumentative, the right of appeal from their supreme courts to the English Privy Council (even that curtailed in Australia), and the home government's nominal right of vetoing their laws, which, in fact, is never exercised. Canada, Australia, and Cape Colony are the chief exemplars. (2) Those where the home government appoints part of the legislative body as well as the governor. This is entirely composed of the Channel Islands, Malta, Cyprus, Ceylon, Mauritius, Jamaica; the Leeward Islands, British Guiana, and Rhodesia. (3) "Crown colonies," where the ruling body, an executive and council (sometimes two councils, executive and legislative), are wholly appointed by the home government, without local representation, and are directly responsible to the colonial secretary, except with India, the greatest of this type, which is under a special secretary of state and home council. Of the others, the chief are the new conquests of the Boer states (this form of government being avowedly provisional for them); the British settlements on the west coast of Africa—Sierra Leone, Nigeria, the Gold Coast, Gambia, and Lagos; the Straits Settlements, and Hong Kong; in America, British Honduras, Trinidad, the Windward and Falkland islands; in Australasia, Fiji. The titles of these imperial rulers and of the group following are various: governor, commissioner, high commissioner, resident, etc. (4) Those administered by a single official under the colonial secretary, without a council. Such are Gibraltar and Aden, Ascension (under the control of the admiralty); in Africa, Basutoland, Bechuanaland, and the protectorates of British Central and Eastern Africa, and British Somaliland—administered respectively by the consul-general at Zanzibar, a resident commissioner, and a consul-general at Berbera. (5) Government by a trading corporation, licensed and supervised by the home government, formerly the chief colonial system in Europe, and the only intelligible object of colonization. Great Britain has now but one dependency of this type: British North Borneo, where the company's governor must be confirmed by the colonial secretary. (6) Mere control of a native government by a resident commissioner, or power to interfere if judged advisable, or sometimes scarcely more than the marking out of a "sphere of influence" within which other nations are debarred from meddling. The chief types of this class are 50 or 60 native states of India, Zanzibar, Uganda, and the native states of the Malay peninsula. A seventh type is so peculiar that its *locus* is not usually classed as part of the British empire at all, although in fact one of the most firmly held and decisively administered:

BRITISH EMPIRE

Egypt, where the province is nominally part of Turkey, the official position of Lord Cromer is consul-general and minister plenipotentiary, and the title of Great Britain to possession is that of surviving partner of an international financial control.

In detail, the components of the empire, the dates and method of acquirement, and the title by which they are held, are as follows:

Europe.—1. The United Kingdom. England in its modern sense, though much restricted toward the north, first owned a common overlord in 827; broken up by the Danes, it became a wholly Danish kingdom in 1013, again an English one in 1042, part of an Anglo-French system in 1066, and was practically restored to itself in 1214, with its northern limits as now. Wales was finally subjugated by Edward I., after a long war with Llewellyn ap Iorwerth, in 1284. Scotland, a kingdom owning overlordship to England, received a king by English arbitration in 1291, revolted and was conquered, revolted again and won its independence in 1314; with the accession of its king, James I., to the English throne in 1603 the two crowns were united, and in 1707 the Scotch parliament was abolished and Scotland incorporated with England. The Isle of Man, a Scandinavian lordship, was ceded to Scotland in 1266 and to England in 1290. The Orkneys and Shetlands were pledged by Denmark to James III. of Scotland in 1468, as security for his wife's dowry, and never redeemed. Ireland was invaded by Strongbow in 1169, and nominally annexed to England by right of conquest in 1172; but only a small cantle of it, "the Pale," was effectively occupied till the time of Elizabeth, and the island as a whole was first effectively subjugated by Cromwell. It was governed by its own parliament till 1800, when the Act of Union incorporated it with Great Britain. 2. The Channel Islands (Guernsey, Jersey, etc.), in the bay of Avranches off the French coast, are the sole remnants of the French possessions of the Angevin house. 3. The fortress rock of Gibraltar, and the small plain at its foot on which the town is built, were taken from Spain in 1704; during the war of the Spanish succession. 4. Malta, with Gozo, etc., islands south of Sicily, were taken from France in 1800, during the Napoleonic wars. Malta is the chief British naval station in the central Mediterranean.

Asia.—1. India, with Burma. For the component parts of this mighty possession, three fifths the size of the United States without Alaska, and for its government, see its name. Its nuclei were three factories of the East India Company: Fort St. George, now Madras, built 1639; Bombay, received from Portugal in 1662 as part of the dowry of Catharine of Braganza, queen of Charles II.; and Fort William, now Calcutta, founded by Job Charnock in 1686. The attempt of the French to build a colonial dominion on the ruins of the Mogul empire, in the 18th century, forced the company's local officers to act in self-defense; with the result that north-eastern India fell into their hands, the decisive event being the battle of Plassey (1757). Wars, cessions, annexations, protectorates, residencies, etc., have gradually brought all the rest of the peninsula under English control. The company ceded its rights to the English government in 1858. 2. Ceylon, the tip of the Indian peninsula, is independently governed. It was taken by England from the Dutch in 1796, during the

French wars, but not ceded to her till the Peace of Amiens in 1802. 3. Cyprus, an island south of Asia Minor: was ceded by Turkey in 1878, as a result of the Russo-Turkish war, in return for a treaty by which Great Britain agreed to defend Turkey against further territorial demands from Russia. 4. Aden, on the south coast of Arabia: was taken by the British in 1839 as a coaling station, in compensation for the maltreatment of shipwrecked British sailors by the natives. The island of Socotra to the east, off the mainland of Africa, was annexed in 1888; and the two—with Perim Island at the mouth of the Gulf of Aden, and the Kuria-Muriyas on the east coast of Arabia—form one administration, a dependency of the Bombay presidency. 5. The Straits Settlements: This group, comprising the end of the Malacca peninsula, was transferred in 1867 from the control of the Indian government to that of the colonial secretary. It consists of (1) Penang, formerly called Pulo Penang and later Prince of Wales Island, originally received by a British adventurer as dowry with a native chief's daughter, then turned over to the East India Company in 1786; (2) Malacca, occupied by the British in 1795, but not formally ceded to them by the sultan of Johore till 1824, along with (3) the island of Singapore, the capital of the whole. Some of the native Malaccan states are also under British protection. 6. Hong Kong, China, was occupied by the British in 1841, as a result of the opium war, and ceded to them in 1843. 7. Labuan, an island off Borneo, of which Great Britain obtained the cession in 1846, with great hopes of its coal mines and harbor not borne out by experience; it has also been a convict settlement. 8. British North Borneo, ceded to a commercial company by native sultans in 1877, but taken under British protectorate in 1888. 9. Brunei and Sarawak, southwest of the above, are governed by native rulers, but under British protection.

Africa.—1. Sierra Leone, on the west coast: was started as a settlement of freed negro slaves in 1787; transferred to the Crown in 1807. 2. The Gold Coast: settlement of 1672 by the Royal African Company, made a dependency of Sierra Leone on the dissolution of that company in 1822, formally ceded by the Dutch in exchange for trade privileges in 1872, and made a Crown colony in 1874. 3. Gambia: settlement united with Sierra Leone in 1822, like the Gold Coast; made a separate colony 1843, reunited to Sierra Leone 1868, then included in the British West African Settlements colony till 1888, when it was again made a separate colony. 4. Lagos, West Africa: the town was an old slave mart destroyed by the British in 1851; the colony was ceded to them by the native rulers in 1861. 5. Nigeria: the Niger coast protectorate was constituted in 1884, old trading rights having been previously exercised for generations; the present protectorate of Nigeria was set up 1 Jan. 1901. 6. Cape Colony: taken possession of as a derelict in 1796, the settlement having thrown off Dutch rule; administered for seven years, then returned to the Dutch; again captured in 1806, Holland having become part of Napoleon's empire; retained till the general peace of 1815, then bought from Holland for \$30,000,000. 7. Natal and Zululand: taken from the Dutch settlers and annexed 1843. 8. Basutoland: annexed to Cape Colony 1871, as the result of an appeal by the Basutos from the claims

BRITISH GUIANA—BRITISH MUSEUM

of the Orange Free State; separated as a special protectorate 1884. 9, 10. The Transvaal and the Orange River Colony: conquered 1900. 11. Zanzibar and Pemba. Pemba was ceded to the British East African Company in 1888 by the sultan of Zanzibar. The latter island was given over to a German protectorate in 1886 by an Anglo-German convention; in 1890 transferred to England in exchange for the island of Heligoland off the German coast, possessed by England and a thorn in the German flesh. 12. East Africa protectorate: recognized by Germany and France in 1890, with that of Zanzibar, for considerations as above and trading rights, and the recognition of the French protectorate over Madagascar. 13. Central Africa protectorate: organized 1891 from the territories of the British South Africa Company. 14. Bechuanaland, constituted a protectorate over native South African tribes in 1895. 15. Rhodesia: the territories of the Royal South Africa Company, chartered in 1889, were brought under the colonial office in 1898, with Matabeleland and Mashonaland. 16. British Somaliland, completing the circle around Africa up to Socotra and Aden; protectorate under the East India Company 1884, constituted a Crown colony 1898.

North America.—1. The Dominion of Canada is the chief. Its nucleus was the territory which fell under British sway by the French and Indian War 1755-60, definitely ceded in 1763. This was divided in 1791 into Upper Canada and Lower Canada, the latter as a real settlement founded by loyalist refugees from the United States, who also founded New Brunswick. England also held north of the United States: (1) Nova Scotia, conquered from the French in 1713, after a previous occupancy 1654-67; (2) Cape Breton, conquered 1748, and restored to France, conquered again in 1758 and ceded by France in 1763, when it was annexed to Nova Scotia; again separated 1784, again united 1820; (3) Prince Edward's Island, till 1799 called Isle St. Jean or St. John Island, then changed in honor of the Duke of Kent; captured from the French 1745, restored, again taken and held in 1758, ceded 1763 and annexed to Nova Scotia, in 1773 again separated. (4) Newfoundland, an old fishing station, ceded by France in 1713. In 1841 Upper and Lower Canada were united. In 1867 the united province was joined with Nova Scotia and New Brunswick into the Dominion of Canada. In 1871 this was joined by British Columbia, formed 1866 out of the older British Columbia and Vancouver Island, the former organized 1858 from the old Hudson Bay territory of New Caledonia; the latter a Hudson Bay territory made a Crown colony in 1849. In 1873 Prince Edward's Island also came into the dominion. Meantime, in 1869, it had acquired the Northwest Territories, and in 1870 set off Manitoba and at once admitted it into the dominion; Keewatin district was created in 1876; Assiniboia, Alberta, Saskatchewan, and Athabasca in 1882. 2. Newfoundland, which still refuses to join the dominion: its history is outlined above. Labrador forms a part of Newfoundland for administrative purposes. 3. The Bermuda Islands: settled 1609. 4. The Bahama Islands: ceded by Spain 1783, after alternate conquest and reconquest. 5, 6. The Windward Islands and the Leeward Islands: taken by the English in the general agreement with France for partitioning

the West Indies in 1660. 7. Jamaica, with Turk's Island and Caicos Island: taken from the Spaniards in 1655. 8. Barbados: colonized 1625, made a Crown colony in 1663. 9. Trinidad, with Tobago: captured in 1797 during the French wars. 10. British Honduras: settled early in the 18th century, but not ceded to Great Britain by treaty from Spain till 1783, formerly known as Balize or Belize. 11. British Guiana: partitioned off from the other Guianas in 1803, and formerly ceded by treaty in 1814.

South America.—The Falkland Islands, east of the southern tip of the continent: fought for by British, French, and Spanish for many years; then nominally controlled by Argentina till 1833, when the British took possession of them for a finality, and established a colony in 1851; it includes also South Georgia to the eastward.

The South Atlantic.—In the No-Man's Land between South America and Africa, and unrelated to either, the British hold three islands. 1. St. Helena: definitively secured from the Dutch by the East India Company in 1673, transferred to the home government in 1834. 2. Ascension: 700 miles northwest of St. Helena, settled in 1815 after Napoleon's deportation. 3. Tristan d'Acunha: a triad of little islands about half-way from the Cape of Good Hope to South America, garrisoned by the British in 1816 while Napoleon was at St. Helena.

Australasia.—1. The Confederation of Australia, formed 1901. The first colony in Australia was the convict settlement of New South Wales, made a self-governing colony in 1841. Western Australia was founded in 1829, South Australia in 1836. Victoria, settled in 1835 as Port Philip, was set off from New South Wales in 1851. Queensland was settled from Moreton Bay in 1825. Tasmania was a convict settlement of the island of Van Diemen's Land from 1803 on, but in 1852 the convict deportation there was stopped, and the colony made self-governing as Tasmania. 2. New Zealand was colonized in 1845. 3. The Fiji Islands came under British sway in 1874 by voluntary cession from Thakombau, the leader of the native chiefs. 4. British New Guinea was delimited and formally annexed in 1884. 5. There are a considerable number of islands in the western Pacific which have come into British hands at various periods, by occupation. The largest are: the Tongas, part of the New Hebrides and the Solomons, Ellice, Gilbert, Union, Cook, and Monahiki.

British Guiana, gē-ān'ā. See **GUIANA**.

British Gum. See **DEXTRIN**.

British Honduras. See **HONDURAS**.

British India. See **INDIA**.

British Legion, The, a corps raised in Great Britain in 1835, numbering 10,000 men, under the command of Gen. De Lacy Evans, to assist Queen Isabella of Spain in the war with Don Carlos. They rendered much assistance to the queen, defeating her Carlist rivals in several battles, notably at Ayetta, during the two years of their campaign. Gen. Evans was himself defeated at Hernani in 1837, but subsequently captured that place and also several others. He acted in conjunction with a naval force under Lord John Hay.

British Museum, a national depository of science, literature, and art, which owes its origin to the will of Sir Hans Sloane, an eminent phy-

BRITISH NORTH AMERICA — BRITOMARTIS

sician and naturalist, who, dying in 1753, bequeathed to the nation his collection of medals and coins, antiquities, seals, cameos, drawings, and pictures, and his library, consisting of 50,000 volumes and manuscripts, on the condition of the payment of \$100,000 to his heirs. This offer was agreed to by Parliament, which authorized a lottery of \$500,000 to implement the bargain, as well as to purchase other collections. Montague House, which was bought for the purpose, was appropriated for the museum, which was first opened on 15 Jan. 1759. The original edifice having become inadequate, a new building was resolved on in 1823, the architect being Sir R. Smirke, whose building was not completed till 1847. It forms a hollow square, facing the cardinal points. The south, or Russell Street front, is the principal one, having an imposing columnar façade of the Ionic order. This, as well as the other three, looks into the central square court, which measures about 320 feet by 240. There are two stories of galleries and rooms round the greater part of the building. Smirke's designs were no sooner completed than it was found that additional accommodation was needed in various departments, and several new rooms were provided; but the library accommodation being wholly inadequate for the accommodation of the readers, as well as for the reception of new books, a grant was obtained from Parliament for a new library building in 1854, and it was completed and opened in 1857, at a cost of \$750,000. It was erected in the interior quadrangle, and contains a circular reading-room 140 feet in diameter, with a dome 106 feet high. The whole arrangements have been completed with the utmost economy in regard to space, and besides ample accommodation for books, the reading-room now contains accommodation for 300 readers comfortably seated at separate desks, which are provided with all necessary conveniences. More recently, the accommodation having become again inadequate, it was resolved to separate the objects belonging to the natural history department from the rest, and to lodge them in a building by themselves. Accordingly a large natural history museum has been erected at South Kensington, and the specimens pertaining to natural history (including geology and mineralogy) have been transferred thither, but they still form part of the British Museum. Externally this building is somewhat heavy in character, but the interior has been treated in a most artistic manner. The British Museum is under the management of 48 trustees, among the chief being the Archbishop of Canterbury, the lord-chancellor, and the speaker of the House of Commons. In all the staff of the institution numbers over 320 persons. The museum is open daily, free of charge. Admission to the reading-room as a regular reader is by ticket, procurable on application to the chief librarian, there being certain simple conditions attached. In 1900 there were 108,566 persons using the reading-room, and 689,249 visitors in addition. The institution contains something like 2,000,000 volumes in the department of printed books. A copy of every book, pamphlet, newspaper, piece of music, etc., published anywhere in British territory, must be conveyed free of charge to the British Museum. There are various catalogues and hand-books prepared by the officers of the museum, and containing classified descriptions of the con-

tents of the different departments. Of these there are eight, namely, the department of (1) printed books, maps, charts, plans, etc.; (2) of manuscripts; (3) of natural history; (4) of Oriental antiquities; (5) of Greek and Roman antiquities; (6) of coins and medals; (7) of British and mediæval antiquities and ethnography; (8) of prints and drawings.

British North America, the Dominion of Canada and the island of Newfoundland, with the portion of Labrador belonging to the latter. The Bermudas may also be included.

British Somaliland, a territory on the west coast of Africa under the protection of Great Britain, lying along the Gulf of Aden from about lon. 43° to 49° E., and extending from about lat. 11° to 8° N. On the east and south-east it is bounded by Italian Somaliland, on the south and west by Abyssinia, and on the north-west by French Somaliland. It has an area estimated at nearly 70,000 square miles, lacking in fertility largely on account of a lack of natural irrigation. The surface is in great part mountainous. The climate is more healthful in the interior than along the coast where there is more dampness. Among the chief products are sheep, cattle, skins, ostrich feathers, myrrh, and incense. The principal ports are Bulhor, Zeyle, and Berbera. The latter, which is the capital, has a good harbor and is in winter the scene of considerable commercial activity. The combined imports and exports are valued at about \$2,500,000. The protectorate, created in 1884, is administered by a consul-general under control of the Crown. In 1894 the boundary between this protectorate and Italian Somaliland was defined. In the spring of 1903 an agitation in this region in favor of the Mad Mullah (q.v.), led to a considerable loss among the British troops and their withdrawal in April. The inhabitants are related to the Abyssinians and Gallas, and on account of their nomadic habits there are no accurate statistics of population. See Peel, 'Somaliland' (1899); Swayne, 'Seventeen Trips Through Somaliland' (1900); Hendebert, 'Au pays des Somalis et des Comoriens' (1901).

British South Africa Company, a corporation established in 1889, with a royal charter, by Cecil Rhodes and others, for the purpose of controlling, settling, administering and opening up by railways and telegraphs, etc., certain districts in Central South Africa. Mashonaland was first settled, and, in 1893, Matabeleland was annexed and settled after the defeat of King Lobengula. In 1895, North Zambesia, in British Central Africa, was added, as well as a strip of territory in the Bechuanaland Protectorate. This territory has been called Rhodesia, or British Zambesia; area, about 500,000 square miles. In consequence of the filibustering raid of Dr. Jameson, an officer of the company, near the close of 1895, Rhodes resigned his connection with the company in 1896, and a joint administrator of the territory was appointed by the British crown. See RHODESIA.

British West Indies. See WEST INDIES.

Britomart's, a nymph of Cretan mythology, fabled to have been raised by Artemis into a deity, on the occasion of drowning herself to escape from the pursuit of Minos. She was presented as patroness of hunters and fishermen.

BRITTANY — BRIVES-LA-GAILLARDE

The name was chosen by Spenser to represent in the 'Faerie Queene' the personification of chastity, and thus contained an allusion to the Virgin Queen, Elizabeth.

Brittany, or **Bretagne**, formerly one of the largest provinces of France, being a peninsula washed by the Atlantic on all sides except the east, where it joined Poitou, Anjou, Maine, and Normandy. It now forms five departments, Finistère, Côtes-du-Nord, Morbihan, Ille-et-Vilaine, Loire-Inférieure, containing nearly 3,327,000 inhabitants on 13,130 square miles. It is supposed to have received its name from those Britons who were expelled from England and took refuge here at various periods between the 5th and 7th century. Before that time it bore the name of Armorica. It formed one of the duchies of France, and was held by sovereigns nearly independent and often at war with the French monarchs till it was united to the crown by the marriage of Louis XII. with Anne of Brittany, the widow of Charles VIII., in 1499. It was given by Louis XII. to Claude, Countess of Angoulême, who married Francis I., and was reunited to the crown in 1532. The province was divided into Upper and Lower Brittany. Agriculture in this territory is very backward, and it is estimated that about one half of the surface lies waste. Corn and wine are produced in small quantities. Flax and hemp, apples, and pears are abundant and of good quality. Cider is the principal drink. Salt is made on the coast, and coal, lead, and iron are found in various parts. There are manufactures of hemp, flax, and iron. The fisheries also employ many of the inhabitants. The people of Brittany still retain their ancient language, which is closely allied to Welsh, and is exclusively used by the peasantry in the western part of the province. Many Celtic remains are found throughout the country.

Brittle Star, also called **Snake Star**, and **Sand Star**, a member of the order of *Ophiurida*, class *Asteroidea*, of the phylum *Echinodermata* (q.v.). It is characterized by the body forming a flattened disk, with cylindrical arms, the stomach not extending into the arms, and there is no intestine or anal opening. The ambulacral furrow is covered by the ventral shields of the tegument, so that the ambulacral feet project from the sides of the arm. It moves faster than the true star-fish, the arms being more slender and flexible. An ophiuran which has accidentally lost an arm can reproduce it by budding. In species of *Ophiothela* and *Ophiactis* the body divides in two spontaneously, having three arms on one side and two on the other, while the disk looks as if it had been cut in two by a knife, and three new arms had then grown out from the cut side.

The ophiurans in most cases undergo a decided metamorphosis like that of the star-fish. The larva, called a "pluteus," is free-swimming, though in some species the young, in a modified larval condition, reside in a pouch situated above the mouth of the parent, finally escaping and swimming freely about.

Our most common brittle star is *Ophiopholis aculeata*, which may be found at low-water mark, and especially among the roots of *Laminaria* thrown upon the beach. It is variable in color, but beautifully spotted with pale and brown, its

general hue being a brick-red. Ophiurans are widely distributed, and live at depths between low-water mark and 2,000 fathoms. Fossil ophiurans do not occur in formations older than the Upper Silurian, where they are represented by the genera *Protaster*, *Palæodiscus*, *Acoura*, and *Eucladia*; generic forms closely like those now living appear in the muschelkalk beds of Europe (Middle Trias).

Britton, John, English archæologist: b. 7 July 1771; d. London, 1 Jan. 1857. In 1787 he came to London, and was employed for six years as cellarman in the Jerusalem Tavern, Clerkenwell, and afterward served in the same capacity in the London Tavern. He next entered the employment of a hop merchant in Southwark, and then an attorney's office in Gray's Inn. During all this period he had sedulously cultivated his taste for reading during his leisure hours, and took part in the proceedings of several debating societies. In 1799 he accepted an engagement from a Mr. Chapman to write, sing, and recite for him at a theatre in Panton Street, Haymarket, at a salary of three guineas per week. From this period his literary career may be said to have commenced, developing itself at first in the form of pamphlets, song-books, and similar minor subjects. He soon advanced, however, to a higher grade, and in 1801 appeared the first two volumes of the 'Beauties of Wiltshire,' by J. Britton and E. W. Brayley. These collaborators, with others, subsequently completed a similar work for all the other counties of England (1801-16, 18 vols.; 1825, 26 vols.). In 1805-14 Britton published his 'Architectural Antiquities of Great Britain' in four volumes, supplemented in 1818-26 by another entitled 'Chronological History and Graphic Illustrations of Christian Architecture in England.' These were followed by his 'Cathedral Antiquities,' in 14 volumes (1814-35); and the 'Dictionary of the Architecture and Archæology of the Middle Ages' (1832-8).

Britton, Nathaniel Lord, American scientist: b. New Dorp, Staten Island, N. Y., 15 Jan. 1859. He was professor of botany in Columbia School of Mines in 1888-96, and later director of the New York Botanical Garden. He has written 'Geology of Staten Island' (1880); 'Catalogue of the Flora of New Jersey' (1882); and collaborated in preparing 'An Illustrated Flora of the Northern United States, Canada.'

Britzka, a Russian traveling carriage, the head of which is always a movable calash, having a place in front for the driver, and a seat behind for servants. The body is so arranged that the traveler can sleep therein at night.

Brives-la-Gaillarde, brèv-là-yârd (ancient BRIVA CURRETIA), a town in France, department of Corrèze, situated amidst vineyards and orchards, on left bank of the Corrèze, surrounded by a fine avenue of elms. The houses are substantially built of stone, but the streets are narrow, and the public squares indifferent. It contains a church of St. Martin dating from the 12th century, some ancient houses in the Gothic style, and a library. Its industries include the manufacture of leather, cotton goods, pottery, wax candles, etc., and it also carries on an active trade in truffles, wool, wine, and nuts. Pop. about 18,000.

BRIXHAM—BROAD SEAL WAR

Brix'ham, an English town in Devonshire, situated on the English Channel, 23 miles south of Exeter. It covers the sides of two hills, and is divided into Upper and Lower Brixham. The parish church is a large ancient structure, in the Perpendicular style. The trade of Brixham is chiefly in fish, and is of considerable extent, London, Bath, and Bristol receiving supplies from this place. The port possesses also a number of vessels engaged in the coasting and foreign trade; those in the latter plying chiefly to the Mediterranean. Ship-building and the manufacture of sails, ropes, paint, etc., are among the other industries. Brixham is celebrated in history as the place where the Prince of Orange, afterward William III., landed, 4 Nov. 1688. In 1858 a cave was discovered on Windmill Hill, containing the bones of extinct mammals, some flint implements, etc. Pop. about 8,090.

Bri'za, a genus of grasses, commonly called quaking-grass, maiden's-hair, or lady's-tresses. There are about 30 species, chiefly found in South America. *B. media* is a native of the United States, and is found occasionally in pastures in the eastern States.

Broach, or **Baroach**, India, a seaport town in Guzerat, Bombay, situated on the Nerbudda, about 30 miles from its mouth. The river here is crossed by a railway bridge, and for about a mile in front of the town is lined with a massive stone wall. Broach is surrounded with ruinous walls, and has narrow streets, with houses mostly of two stories and built of brick. There are no buildings of interest. It is an ancient place, and one of the oldest seaports of western India, and was formerly famous for its cotton manufactures. The town was taken by storm by the British in 1772, and, with the district, ceded to them by treaty with Scindiah in 1803. Formerly it had a great export of cotton, and it still carries on a trade in cotton, grain, and seeds with Bombay and Surat. Pop. (1901) 42,300 (including many Parsees). The district of Broach lies on the east side of the Gulf of Cambay. Broach cotton holds the highest place in the Bombay market. Area, 1,453 square miles; pop. about 350,000.

Broad Arrow, a government mark placed on British stores, guns, etc., to distinguish them as public or Crown property. It was the cognizance of Henry, Viscount Sydney, Earl of Romney, master-general of the ordnance, 1693-1702, and was at first placed only on military stores. Persons in possession of goods marked with the broad arrow forfeit the goods and are subject to a penalty, and it is made felony by statute to obliterate or deface it. The mark is also used in the Ordnance Survey maps to denote points from which measurements have been made.



Broad Arrow.

Broad Church, a name given originally to a party in the Church of England, regarded as being midway between the Low Church or Evangelical section and the High Church or Ritualistic; now widely applied to the more tolerant and liberal section of any denomination.

Broad-headed Snake. See DEATH-ADDER.

Broad Mountain, an elevation in the anthracite coal region of Pennsylvania; a plateau of conglomerate rock, about three miles wide and 2,000 feet above the sea, undulating just enough to contain three shallow coal-basins intermediate between the Pottsville and Mine Hill on the south, and the Mahoning and Shamokin coal-fields on the north.

Broad Piece, a term applied to some English gold pieces broader than a guinea, particularly Caroluses and Jacobuses.

Broad River, a stream of North and South Carolina, rising at the foot of the Blue Ridge, in the western part of the former State, and entering York district in South Carolina. It then takes a southerly course through a rich and highly productive tract of country covered with fields of maize and cotton, and finally unites with the Saluda to form the Congaree River. The city of Columbia is at their junction. The river is about 225 miles in length, and is navigable for shallow-draft boats for upward of 140 miles.

Broad Seal War, 1838-9, a disputed-election case in New Jersey and in Congress; turning in New Jersey on the power of a county official, in collusion with the State executive, to nullify the result of a State vote; in Congress on the right of the clerk to base official action on information not before Congress. New Jersey then elected her six congressmen on general ticket, and in 1838 that of the Democrats carried the State by an average of about 100; but the Whig county clerk of Middlesex County threw out the vote of South Amboy, with 252 Democratic majority, for lack of the election-clerk's signature, and for other irregularities, giving the Whigs five of the six seats. The Democrats claimed that such technicalities had been repeatedly waived, and were counter-vailed by like ones in Whig towns; and, even so, that by law the governor and council, as a canvassing board, must send at once for any missing return and pass on its validity. Those officials were Whigs, however, and they decided that they could not go behind the clerk's certificate, and issued credentials to the Whig candidates under the "broad seal" of the State. This would have made only the usual party broil, but that the national House stood 119 Democrats to 118 Whigs without the New Jersey members, so that the decision carried with it control of the organization of Congress. The Democratic clerk of the House, H. A. Garland, of Virginia, on its meeting 2 Dec. 1839, omitted the New Jersey members in his roll-call, on the ostensible ground that their seats were to be contested and he must leave the decision to Congress; really because excluding them gave his party the speaker and the committees, and incidentally secured himself the clerkship however the contest was decided. This was utterly illegal, as there could be no contest till a congress was organized to bring a contest before; but he doubtless felt it as legitimate as the trick by which the Whig members were sent there, and that party could hardly complain of unfairness. For three days there was helpless rage and anarchy in the House, the clerk refusing to put the question upon any of the motions to bring order out of the chaos. Finally on the 5th the leaders of both parties called in John Quincy Adams (q.v.), the one member who had

BROAD-TOP MOUNTAIN—BROADWAY

no party or affiliations of any sort, and who was respected as at once immutably just, unshrinkingly courageous, and of the highest parliamentary knowledge. He called upon the meeting to organize itself, offered a resolution ordering the clerk to call the names of the New Jersey members with credentials, and on the clerk's refusal announced that he would put the question himself. He was at once elected speaker *pro tem.*, and for six days more the fight went on to choose a permanent speaker, with both New Jersey delegations voting. On the 11th a motion was carried that neither delegation had a right to vote till the contest was decided; on the 16th a compromise was made by which R. M. T. Hunter, of Virginia, a Whig who favored the Democratic sub-treasury scheme, was chosen speaker. On 10 March 1840 the Democratic contestants were seated; on 16 July the majority report of the committee on the case, declaring them duly elected, was accepted by a vote in which all but 22 Whigs refused to take part, on the ground that the report and testimony were too long to examine. The political prize at stake had caused the parties to exchange principles, as they did earlier on the Louisiana Purchase and later on the Electoral Commission; the Democrats, though strict-constructionists, disregarded State certificates and insisted on going behind the returns; the Whigs, though upholding equity against forms, clung to the sanctity of a State certificate however obtained.

Broad-top Mountain, a trapezoidal plateau of semi-bituminous coal measures, in Huntingdon and Bedford counties, Pennsylvania. The highest point is about 2,600 feet above the sea. It is surrounded by a red shale valley, and an outside ring of Devonian rocks, called Terrace, Harmer, and Sidelong mountains. Through gaps in this ring flows the Raystown branch of the Juniata. The mountain contains two principal coal basins. It contains in its deepest troughs about 900 feet of coal measures, and takes in the Pittsburg coal bed, with one of the limestones above it. Coal was mined here for blacksmithing nearly 100 years ago. The coal is a semi-bituminous steam coal, containing from 12 to 18 per cent of volatile matter, and of the same qualities as Cumberland coal.

Broad'bent, Sir William Henry, English physician: b. Yorkshire, 23 Jan. 1835; d. London, 10 July 1907. He was educated at the Royal School of Medicine in Manchester and at Paris. He was at first appointed physician to the Western General Dispensary; then physician to the London Fever Hospital and the Saint Mary's Hospital successively. He was physician extraordinary to Queen Victoria, 1898-1901; and in the latter year was appointed physician-ordinary to King Edward VII. He was a member of the Medical Society of London and was censor of the Royal College of Physicians, 1888-9, and 1895-6. He wrote 'The Pulse' and 'The Heart.'

Broad'casting, a mode of sowing grain by which the seed is cast or dispersed upon the ground with the hand, or with a machine devised for sowing in this manner; opposed to planting in drills or rows.

Broad'head, Garland Carr, American geologist: b. Albemarle County, Va., 30 Oct. 1827. He studied at the University of Missouri and

was long the State expert in geology. He was professor of geology at the University of Missouri, 1887-97, and he is considered an authority on the Missouri coal measures. His writings include 'Geological Survey of Missouri Iron Ores and Coal Fields'; 'Geological Survey of Missouri'; and 'Illinois Geological Survey Report.'

Broad'hurst, Henry, English politician and labor organizer: b. Oxfordshire, 13 April 1840. As a boy he worked in a blacksmith's shop; then as a stone mason till 1872. He has been prominent in the labor movement; in 1875 he was secretary of the Labor Representative League and of the parliamentary committee of the Trades Union Congress. He has been a member of Parliament for Stoke-upon-Trent, 1880-5; for Bordesley, 1885-6; for Nottingham, 1886-92. He was under-secretary in the Home Department in 1886, and has served on several royal commissions for the investigation of the condition of the laboring class. He wrote 'Handy Book on Leasehold Enfranchisement' (with Sir R. T. Reid).

Broad'mouth, or **Broad'bill**, one of about a dozen species of small lethargic, songless birds of the family *Eurylemidae*, having a notable breadth of beak. Flocks of these birds are distributed through the woods from the Himalayas to the Philippines. The broadmouths are brilliant in plumage, and mainly fruit-eaters, with the exception of two species of the genus *Calypotomena*, which are insectivorous.

Broads, The Norfolk, England, a series of lakes, usually said to be formed by the widening or broadening out of the rivers. The broads *par excellence* are those of the Bure or North River (which empties into the sea at Yarmouth), and its tributaries, the Ant and the Thurne. The broads have grown greatly in favor with holiday-makers in recent years.

Broad'side, in a naval engagement, the whole discharge of the artillery on one side of a ship of war, above and below. The fighting power of a ship was formerly estimated by the weight of her broadside. The term is also applied to any large page printed on one side of a sheet of paper, and, strictly, not divided into columns. In this sense it is sometimes called a broadsheet.

Broad'stairs, England, a watering-place in the Isle of Thanet, Kent, two miles northeast of Ramsgate. It is said that the name is derived from the width of the passage leading down to the sea.

Broad'sword, a sword with a broad blade, designed chiefly for cutting, formerly used by some regiments of cavalry and Highland infantry in the British service. The claymore or broadsword was formerly the national weapon of the Highlanders.

Broad'way, the chief thoroughfare, and the principal business street of New York. Starting from Bowling Green at the lower extremity of the island, it runs nearly due north to 14th Street, whence it takes a westerly diagonal course to 78th Street, at which point it again runs due north to 103d Street. Taking the westerly trend again to 108th Street, it thence runs north again, and, following the course of the old post road, is continued under the name of Broadway as far as Albany. Its continuous

course is interrupted by two public squares; Union Square at 14th Street, and Madison Square at 23d Street. Below Madison Square it is devoted mainly to office buildings and wholesale establishments. Above Madison Square (where it intersects Fifth Avenue and 23d Street) are theatres and the chief hotels. Its length below 59th Street is about five miles, and is traversed by an electric railway. A portion of the subway is excavated under the part of Broadway which is above 42d Street, and also that part below Park Place.

Broad'wood, John, English pianoforte manufacturer: b. Cockburnspath, Scotland, 1732; d. 1812. Going to London, he entered into partnership with a Swiss maker of harpsichords, named Burkhardt Tschudi, the firm being known as Tschudi & Broadwood. In 1769 his partner retired, and on his death four years later his son became a partner with Broadwood; but from 1783 till 1795, when Broadwood's son entered into partnership with him, he had the sole control of the business. The firm has long been known as John Broadwood & Sons. By the skill of Broadwood and those associated with him many improvements were introduced in the construction of the pianoforte, and for a long time the history of the firm was practically the story of the progressive development of that instrument.

Brobdignag, an imaginary country described by Dean Swift in 'Gulliver's Travels.' The inhabitants are represented as being of enormous size and the details of their environment in proportion; whence has arisen the adjective "brobdignagian."

Broca, Pierre Paul, pē-ār pōl brō-kā, French surgeon and anthropologist: b. Sainte-Foy-la-Grande, department of the Gironde, 28 June 1824; d. Paris, 9 July 1880. In 1841 he began the study of medicine at Paris, became hospital surgeon in 1844, anatomical assistant in the Faculty of Medicine in 1846, preparator in anatomy in 1848, and professor in 1867. Between 1861 and 1865 he carried out his famous researches on the localization of cerebral functions. He gained great distinction in anthropology, and in 1859 founded the Paris anthropological society. During the Franco-German war he engaged in hospital work at La Pitié, but when peace was concluded he resumed his teaching. In 1872 he founded the 'Revue d'Anthropologie,' and four years later he established the Ecole d'Anthropologie, which formed the nucleus of the later Institut Anthropologique. His writings are numerous and important.

Brocade', a fabric having a pattern of raised figures; often a stuff of silk, enriched with a raised pattern of flowers, foliage, and other ornaments. Formerly it signified a stuff woven all of gold or silver threads, or in which silk was mixed with such threads; at present all stuffs are so called if they are worked with raised flowers or other figures, and especially when the figures are in more than one color. Brocade is in silk what damask is in wool. Brocatelle, in which cotton and wool are used instead of silk, is an imitation of brocade.

Brocatelle'. See BROCADE.

Brocchi, Giovanni Battista, jō-vān'nē bāt-tēs'tā brōk'kē, Italian mineralogist and geologist: b. Bassano, 18 Feb. 1772; d. Khartum,

25 Sept. 1826. In 1808 his valuable researches upon iron mines and metalliferous mountains procured him the office of inspector of mines in the newly established kingdom of Italy. In 1814 he published a work on the structure of the Apennine range, with an account of the fossils of its strata. He corrected the erroneous view of Brieslak, who supposed Rome to occupy the site of an extinct volcano, to which he ascribed the tufa and other volcanic materials found on the seven hills. Brocchi, on the other hand, satisfactorily showed that they are derived either from Mont Albano or Monte Cimino. Both of these are extinct volcanoes, the first 12 miles, the other still farther, to the north of the city. In 1823 Brocchi sailed for Egypt with the view of exploring the mineral resources of that country. He received a commission from Mehemet Ali to examine his recent conquest of Sennaar, but the climate proved too much for his constitution.

Broccoli, a variety of the cauliflower, hardier and with more color in the flower and leaves. The chief varieties are green, purple, and dwarf broccoli. It is inferior in flavor to cauliflower, but serves as a substitute for it when the latter cannot be obtained. See CAULIFLOWER.

Brochantite, brō'shōn-tit (from BROCHANT DE VILLIERS, a French mineralogist), an orthorhombic transparent or translucent mineral, with hardness 3.5-4; specific gravity, about 3.90; lustre vitreous, pearly on one cleavage face. It is a basic copper sulphate having the formula $\text{Cu SO}_4 \cdot 3 \text{ Cu (OH)}_2$. It much resembles atacamite, like which it occurs in many copper mines, notably in the Urals, in Cornwall, England, and in Chili. In the United States its most important localities are in Utah and Arizona.

Brochs, brōhs, class of edifices peculiar to Scotland, particularly in the northern counties, including Orkney, Shetland, and the Western Isles, more than 300 in all being known. A broch is a hollow circular tower of dry-built masonry, rarely more than 70 or less than 40 feet in total diameter, occasionally at least 50 feet high, and enclosing a circular court or area from 25 to 45 feet in diameter. The wall, which may be from 9 to 20 feet thick, is carried up solid for about 10 feet, except where pierced by the narrow passage giving entrance to the interior court, or where chambers are hollowed within its thickness and opening off the court. Above this height there are horizontal galleries in the wall, each about 6 feet high and 3 feet wide, running completely round the tower, except where crossed by the stair giving access to them, and having windows placed above each other, and all looking into the central area. The only external opening is a doorway about 5 or 6 feet high, and rarely more than 3 feet wide. The passage varies from 9 to 18 feet in length, and about 4 feet from its outer entrance is the door. Many of the brochs are found in naturally strong positions, such as a precipitous eminence or a promontory projecting into a loch, and further defenses are afforded by ditches and embankments, earthen ramparts, and dry stone walls. Hence it is clear that they were intended to serve as places of shelter and defense, for which purpose they are admirably contrived, as they form a series of



LOOKING DOWN LOWER BROADWAY, NEW YORK.

BROCK — BROCKHAUS

strongholds that could be reduced only by a regular siege, the inmates being safe against missiles and even against fire, from the height and strength of the walls. Provided with a sufficiency of food, and obtaining water from a well inside the enclosure, the people thus sheltered could hold out for an indefinite time. The relics found in the brochs, like the structures themselves, are Celtic in character, and belong to post-Roman times. The Brochs were probably built as places of refuge from the Scandinavian vikings that for centuries were a scourge to many of the European coasts, but little or nothing of their history is known. The relics include swords, spears, knives, axes, and chisels of iron, with rings, bracelets, pins, and other articles of bronze or of brass. Numerous articles made of bone and horn are also found, with stone implements, as querns, mortars, pestles, bowls and cups, lamps, etc. Pottery of various kinds is also found. Spinning and weaving were evidently practised by the broch-builders. Agriculture, hunting, and fishing furnished subsistence; and animal food was furnished by the stag, roe, reindeer, ox, sheep, goat, and pig, as well as by the whale, porpoise, cod, haddock, and other denizens of the sea.

Brock, Sir Isaac, English soldier: b. Guernsey, 6 Oct. 1769; d. Queenston, Canada, 13 Oct. 1812. He was educated at Southampton and Rotterdam, and entered the army as ensign in the 8th Regiment in 1785. In 1791 he transferred to the 49th Infantry, and saw service in the West Indies. In 1802 he went to Canada at the head of that regiment, returning three years afterward; but in 1806 he was again in North America. He became major-general in 1811, and in the following year compelled the surrender of the American general Hull at Detroit. For this service he received knighthood in the Order of the Bath, but he did not live long to enjoy the honor; for during an attack on Queenston by another American force, only three days after he was knighted, he was mortally wounded. The sum of £1,575 was voted by the House of Commons for a monument to Brock, which now stands in the south transept of St. Paul's Cathedral, London. There is another monument to him at Queenston, erected at public cost in 1842.

Brock, Thomas, English sculptor: b. 1847. He studied with J. H. Foley and finished after the latter's death a number of his works. Among his productions is the Longfellow bust in Westminster Abbey. He is a member of the Royal Academy.

Brockedon, brók'dén, William, English artist and inventor: b. Devonshire, 1787; d. London, 1854. He was the discoverer of a method by which plumbago and its dust (previously thrown away as valueless) could be freed from impurities and re-solidified, so as to make a superior description of lead pencils, of various degrees of hardness, well adapted for artists' use. Mr. Brockedon was a painter, and author of 'The Passes of the Alps,' with over 100 folio engravings from drawings by himself. He also produced 'Italy, Classical and Picturesque' (1842-3); and 'Egypt and Nubia' (3 vols. 1846-9).

Brock'en, a mountain in Germany, popularly known as Blocksberg, the highest summit

of the Harz Mountains (about 3,745 feet), in the Prussian government of Magdeburg. It was known to the Romans as Mons Bructerus. The bare, treeless summit is covered with snow from November to June; and on it are a hotel and an observatory. Under certain atmospheric conditions the visitor may see a gigantic figure of himself reflected on the clouds (the "Spectre of the Brocken"). According to a popular legend the German witches used to assemble here on Walpurgis Night (q.v.) for an annual orgy. Two driving-roads and a railway lead up the mountain. Many tourists visit the Brocken during the summer, and in clear weather an extensive view may be obtained.

Brocket (Fr. *broche*, a "spit" or "tine"), a book-name given to Brazilian deer of the sub-genus *Coassus*, because of their spike-like antlers. There are three species, varying in height from 19 to 27 inches, namely: (1) Guazuviva (*Coassus nemorivagus*), or Brazilian deer; (2) Pita (*Coassus rufus*); (3) A similar form, the pudu (*Pudua humilis*) of the Chilean Andes, the smallest of all deer, having spike horns only about two inches long.

Brockett, Linus Pierpont, American author: b. Canton, Conn., 16 Oct. 1820; d. Brooklyn, 13 Jan. 1893. He graduated at the Yale Medical School in 1843, and practised medicine for a few years. Later he devoted himself to editorial and other literary work. He wrote a 'History of Education'; 'Men of Our Day'; 'The Year of Battles'; 'Epidemic and Contagious Diseases'; 'The Great Metropolis'; etc.

Brockhaus, Friedrich Arnold, fréd'rīn ār'nöld brók'hows, German publisher, founder of the publishing firm of Brockhaus in Leipsic: b. Dortmund, 4 May 1772; d. Leipsic, 20 Aug. 1823. He was educated at the gymnasium of his native town, and in 1793 went to Leipsic, where he devoted two years to the acquisition of scientific knowledge and the principal modern languages of Europe. In 1795 he established at Dortmund a mercantile house for the sale of English manufactures, which he removed to Arnheim, in the Netherlands, in 1801, and to Amsterdam in 1802. Although he managed his business with success, he abandoned it out of distaste for mercantile pursuits in 1804, and entered into the book trade at Amsterdam. After the annexation of Holland to the French empire (1810), Brockhaus returned to Germany, and re-opened his establishment in Altenburg (1811). In 1813 the firm received the title of F. A. Brockhaus. In 1808 Brockhaus had purchased the copyright of the German 'Conversations-Lexicon,' which had been begun in 1796. In 1809-10 he completed the first edition by the publication of two supplementary volumes. In 1812 he began to publish the second edition of this work, which was finished under his own editorship. It was favorably received and had an extensive sale. The business now rapidly extended, and was removed to Leipsic in 1817. It still is carried on by the grandsons of the founder, and there are now chief branches in Berlin and Vienna. Among the literary undertakings of the house have been several important critical periodicals and some large historical and bibliographical works. The 'Conversations-Lexikon,' distinctively associated with the name of Brockhaus, has now reached a 14th edition.

Brockhaus, Hermann, German Orientalist: b. Amsterdam, 28 Jan. 1806; d. Leipsic, 5 Jan. 1877. He was educated at Amsterdam and at Göttingen and Bonn, where he devoted himself to Oriental languages. He lived for a long time in France and England and then settled in Dresden. In 1839 he went as professor to Jena, and in 1841 to Leipsic, where he became professor of Sanskrit, a position he held until his death. He published many works on Oriental literature, and edited the great 'Allgemeine Encklopädie' of Ersch and Gruber.

Brockton, Mass., a city in Plymouth County, situated on the N. Y., N. H. & H. R.R.; 20 miles south of Boston. It is one of the largest boot- and shoe-manufacturing places in the country, and beside these articles has extensive manufactories of rubber goods, shoe machinery and supplies, tools, and bicycles. It contains the villages of Campello, Montello, Marshall's Corner, Brockton Heights, Clifton Heights, and Salisbury Square. It was settled in 1700, was incorporated as a town in 1821, and chartered as a city in 1881. There are two national and two savings banks, a public library, with over 26,000 volumes; public school property valued at over \$500,000; and a property valuation of \$34,334,925. Population (1910) 56,878.

Brockville, Canada, port of entry, and the chief town of the united counties of Leeds and Grenville, Ontario, on the Saint Lawrence River below the Thousand Islands and on the Grand Trunk Railway. It is 125 miles by rail south of Montreal and 40 miles by water below Kingston and is a terminus of the Canadian Pacific Railway, and of the Brockville, Western & Sault Ste. Marie Railway. It is a port for the Saint Lawrence steamers and is connected by ferry with Morristown, New York State. Brockville is lighted by gas and electricity and has excellent sewerage systems. It has numerous churches and public buildings, a collegiate institute, 4 public schools, 1 separate school, a manual training school, and an art school. The manufactures comprise stoves, carriages, agricultural implements, hats, cigars, chemicals, lumber, flour, gloves, tools, machinery, and foundry products. It is named after General Sir Isaac Brock, (q.v.).

Brockway, Zebulon Reed, American penologist: b. Lyme, Conn., 28 April 1827. His connection with prison administration began at the Connecticut State Prison. He was connected successively with the penitentiaries of Albany and Monroe counties, N. Y., and with the House of Correction, Detroit, Mich. He is best known in connection with the penal-reform methods introduced during his superintendency of the New York State Reformatory at Elmira, a position which he filled from 1876-1900. He has written numerous papers and magazine articles on penology.

Broderick, brôd'rick, David Colbreth, American legislator: b. Washington, D. C., 4 Feb. 1820; d. Lake Merced, Cal., 16 Sept. 1859. He was defeated for Congress in New York in 1846; went to California, and was elected a member of the Constitutional Convention of 1849; served as speaker of the Senate; and was elected to the United States Senate in 1856, where he opposed the admission of Kansas.

Broderip, brôd'rip, William John, English naturalist: b. Bristol, 21 Nov. 1789; d. London 27 Feb. 1859. He graduated from Oriel College, Oxford, in 1812; studied law, and was called to the bar in 1817; and subsequently occupied several legal posts. In 1851 he became treasurer of Gray's Inn, with which office was combined that of librarian. He was an enthusiastic naturalist, and made many fine collections, his conchological cabinet being purchased for the British Museum. In 1847 he published 'Zoological Recreations,' and five years later appeared 'Leaves from the Note-Book of a Naturalist.'

Brodrhead, John Romeyn, American historian: b. Philadelphia, 2 Jan. 1814; d. New York, 6 May 1873. He graduated at Rutgers College in 1831. He was author of a 'History of the State of New York,' and he made in Europe a valuable collection of documents bearing upon American history, that was published by the State of New York.

Brodiaea, brô-di-é'a, a small genus of western American corm-rooted plants of the natural order *Liliaceae*, which are popular as garden flowers. The species are of low growth, and have several purple, red, white, or yellow funnel-shaped flowers on a scape. According to some authors several related genera are grouped in this, and cultural methods vary in consequence. For list of species and cultural directions consult: Bailey and Miller, 'Cyclopedia of American Horticulture' (N. Y. 1900-02).

Bro'die, Sir Benjamin Collins, English surgeon: b. Winterslow, Wiltshire, 9 June 1783; d. Broome Park, Surrey, 21 Oct. 1862. His father superintended his education till he was 18, after which he went to the Hunterian School of Anatomy. In 1803 he became a pupil of Sir Everard Home at St. George's Hospital, and in 1805 was appointed assistant to Mr. Wilson, demonstrator of anatomy. In 1809 he became a lecturer of the school and assistant surgeon of the hospital. In 1810 he was elected Croonian lecturer to the Royal Society, and the excellence of his papers caused him to be elected a Fellow, and in the following year he received the Copley medal. His reputation as a distinguished surgeon was now established, and his professional career became one of uniform success. From 1819 to 1823 he was professor of anatomy at the Royal College of Surgeons. In 1822 he was elected a full surgeon at St. George's. He continued giving clinical lectures there till 1830, when the increasing demands of his profession compelled him to discontinue them. In 1832 he succeeded Sir Everard Home as sergeant-surgeon to William IV., and was made a baronet by patent in 1834. Queen Victoria continued him in the same appointment. From 1835 to 1846 he was a member of the Court of Examiners of the College of Surgeons, and in 1844 he was president of the court. In 1858 he was elected president of the Royal Society, which honor he held till 1861. For some years before his death his sight failed, and for about two years he was almost totally blind. As a professional practitioner his gains exceeded those of almost any man of like profession in his time. In 1851 he republished a selection of his earlier essays, entitled 'Physiological Researches.' His work on 'Pathological and Surgical Observations on Diseases of the Joints' (1818) was

esteemed of great value both in Great Britain and on the Continent, and went through many editions. In 1854 he published a work in a colloquial form entitled 'Psychological Inquiries.' The dialogue is not controversial, and the work contains the mature opinions of the author on various speculative subjects.

Brodrick, George Charles, English educator: b. Castle Rising, Norfolk, England, 5 May 1831. He was educated at Eton and Balliol College, Oxford, and University of London. He was called to the bar in 1859. From 1877-9 he was a member of the London School Board. In 1881 he became warden of Merton College. Among his works are: 'Political Studies'; 'English Land and English Landlords'; 'Memorials of Merton College'; 'Short History of Oxford University'; and 'Memories and Impressions.'

Brodrick, William St. John Freemantle, English statesman: b. 14 Dec. 1856. He was educated at Eton and at Balliol College, Oxford. From 1880-5 he was member of Parliament for West Surrey; 1886-92, financial secretary to the war office; 1895-8, under-secretary of state for war; 1898-1900 under-secretary of state for foreign affairs; afterward becoming secretary for war.

Brodsky, Adolf, Russian violinist: b. Taganrog, South Russia, 21 Feb. 1851. He first played in public at the age of nine, and later went to Vienna to pursue his musical studies. In 1879 he became director of the symphony concerts in Kieff, and later held a professorship in the Leipsic Conservatory. As a soloist he appeared in concerts in several of the leading cities of Europe. He came to the United States and taught for a time in Scharwenka's Conservatory, New York, but returned to Leipsic. In 1895 he was made director of the Royal College of Music, Manchester, England.

Brody, Austria, a town in Galicia, near the Russian frontier, 58 miles east-northeast of Lemberg, on a swampy plain. It has broad streets, houses mostly built of stone, an old castle, three churches, Jewish synagogue, etc. About two thirds of its inhabitants are Jews, who have a hospital for themselves and a college for the instruction of artists and mechanics. The commerce, carried on principally by Jews, is important, the town being favorably situated for the interchange of goods between Austria and Russia, and Turkey. Pop. about 20,000.

Broglie, brô-lê, a family distinguished in the annals of French wars and diplomacy, which derives its origin from Piedmont. Among its members are:

1. **FRANÇOIS MARIE, DUC DE**, French soldier: b. Paris, 11 Jan. 1671; d. Ferrières, 22 May 1745. From 1689 he fought with distinction in the Netherlands, Germany, and Italy. He was also employed in diplomatic affairs, and concluded a treaty between France, England, and Prussia in 1725. He rose by degrees till in 1734 he became marshal of France. In the war of the Austrian succession he had the chief command of the armies in Bavaria and Bohemia.

2. **VICTOR FRANÇOIS, DUC DE**, French soldier: b. (the eldest son of the preceding), 19 Oct. 1718; d. Münster, 1804. He commenced his career under his father in the battles of Guastalla and Parma (1734); was engaged in all the wars of France, and was created marshal in 1759.

Jomini considered him the only French general who had shown constant ability during the Seven Years' war. He was engaged in the battles of Hastenbeck, Rossbach, Sondershausen, and Lützenberg, and, being appointed to the chief command, defeated the Prussians and Hessians at Bergen in 1759, for which Francis I. of Austria created him a prince of the empire. In 1760 he gained another victory at Corbach, but was defeated, together with the Prince of Soubise, at Willingshausen, in the following year. In consequence of this and the favor of Soubise at court he was exiled. He was recalled in 1764, and in 1789, when the Revolution broke out, Louis XVI. appointed him minister of war; at the same time he received the command of the troops that were to keep Paris in check. The desertion of the National Guard rendered all his efforts vain, and Broglie left France. In the campaign of 1792 he commanded a division of the *émigrés* without success. After its close he withdrew entirely from public life.

3. **VICTOR CLAUDE, PRINCE DE BROGLIE**, French soldier: b. (third son of the preceding), 1757; d. Paris, 27 June 1794. He entered at first into the views of the revolutionary party. He was deputy of the nobility of Colmar to the States-General in 1789. After the dissolution of the Constituent Assembly he was appointed field-marshal in the army of the Rhine, but upon his refusal to acknowledge the decree of 10 August, suspending the royal authority, was deprived of his command, summoned before the revolutionary tribunal, and led to the guillotine.

4. **ACHILLE CHARLES LÉONCE VICTOR, DUC DE**, French statesman: b. Paris (son of the preceding), 1 Dec. 1785; d. Paris, 25 Jan. 1870. In 1816 he married a daughter of Madame de Staël and was made a member of the chamber of peers. After the Revolution of 1830 the Duc de Broglie and Guizot were the heads of the party known as *doctrinaires*. He was minister of public instruction for a short time in 1830, and minister of foreign affairs from October 1832 to April 1834. In 1849 he was a conservative member of the Legislative Assembly, and after the *coup d'état* he continued a bitter enemy of the imperial régime. His later years were devoted to philosophical and literary pursuits.

5. **JACQUES VICTOR ALBERT, DUC DE**: b. Paris (son of the preceding), 13 June 1821; d. 1901. In 1846 he became secretary to the embassy at Madrid, whence he was transferred to that at Rome, but the revolution of 1848 caused him to give up public life. From that time he became known as an able writer in political reviews. In 1856 he published 'L'Histoire de l'Eglise et de l'Empire,' in six volumes, a work which gained him a chair in the Academy. In 1871 he was elected to the National Assembly for the department of Eure, and in the same year became ambassador at London. He led the opposition to Thiers during 1872-3, and finally succeeded in defeating him. In the latter year he became minister of foreign affairs and president of the council, but in 1874 he suffered defeat. In 1885 he again gave up political life and devoted himself to his historical studies. Among his works are 'Le Secret du Roi Louis XV.' (1878); 'Frédéric II. et Marie-Thérèse' (1883); 'Maurice de Saxe et le Marquis d'Argenson' (1891); 'La Paix d'Aix-la-Chapelle' (1892); 'Le Père Lacordaire' (1895); 'Malherbe' (1897); etc.

BROGNY — BROKER

Brogny, Jean Allarmet, zhōn ăl-lär-mă brōn-yē, Italian cardinal: b. Brogny, near Annecy, Savoy, 1342; d. Rome, 16 Feb. 1426. Although a swineherd in his youth, he attained, by his learning and virtues, a position of great influence and eminence in the Church. He was successively made bishop of Viviers, of Ostia, archbishop of Arles, and bishop of Geneva, and finally cardinal and chancellor of the Church of Rome. During the great schism which divided the Church for more than 40 years Brogny devoted himself to the work of conciliation. The Council of Constance being called for that purpose by John XXIII. and the Emperor Sigismund, the former was deposed at the sixth session, after which Brogny presided as senior cardinal until the 41st, when Cardinal Colonna was elected Pope, 14 Nov. 1417, chiefly through Brogny's influence, under the name of Martin V., and the holy see was once more established at Rome. As president of the Council of Constance he had to pronounce the sentence of death upon Huss, to whom he had shown great kindness during the trial, having visited him several times in his prison and exhorted him, but in vain, to save his life by recanting his creed. The cardinal was the founder of the hospital of Annecy, and of the College of St. Nicolas at Avignon.

Brogue, brōg (Ir. and Gael. *brog*), a coarse and light kind of shoe made of raw or half-tanned leather, of one entire piece, and gathered round the foot by a thong, formerly worn in Ireland and the Highlands of Scotland. The term is also used of the mode of pronunciation peculiar to the Irish, but whether the word in this sense is the same as in the other is doubtful.

Broiling, the cooking of meat or fish on a gridiron above a fire, or by laying it directly on the coals, a very wholesome method of cookery. See **COOKERY**.

Broke, Sir Philip Bowes Vere, British admiral: b. Ipswich, 9 Sept. 1776; d. 2 Jan. 1841. He entered the navy in 1792, and, after he had seen much active service, distinguished himself in 1813 as commander of the frigate *Shannon*, in the memorable action which that vessel, in answer to a regular challenge, fought with the *Chesapeake* off the American coast. The *Shannon*, carrying 38 guns and 330 men, in an engagement of only 15 minutes boarded and captured the *Chesapeake*, carrying 49 guns and 440 men. Sir Philip, who was severely wounded in the action, was immediately made a baronet, and in 1815 Knight Commander of the Bath. He became rear-admiral in 1830.

Broken Hill, Australia, a mining town in the western part of New South Wales, south of Stanley Range, about 925 miles west of Sydney. It stands in a district which contains many silver mines; and asbestos, lead, gold, copper, etc., are also found here. One of the silver mines, the Proprietary, is the most productive in the world. It is connected with Silverton and Adelaide by rail. Pop. about 20,000.

Broken-wind, a disease in horses, often accompanied with an enlargement of the lungs and heart, which disables them for bearing fatigue. In this disease the expiration of the air from the lungs occupies double the time that the inspiration of it does; it requires also two

efforts rapidly succeeding each other, attended by a slight spasmodic action, in order fully to accomplish it. The disease is caused by rupture of the air-cells, and there is no known cure for it. See **HEAVES**.

Broker (Lat. *abroccator*, perhaps from the Saxon *abroccan*, to break up, from which is derived "abbroachment," the breaking up of goods or selling at retail). The early use of this term designated a retailer of goods, generally supposed to belong to another person, and thence applied to any one making a bargain as the agent of another for the sale or purchase of goods. The distinctive character of a broker was that he acted in behalf of another and in his name; at least, when the contract came to be consummated, the name of the principal was in the ordinary course disclosed. It was a further incident of a broker's employment that he did not have possession of the goods sold, or receive possession of the goods purchased, in which respect he differed from a factor. And these principles still apply. But the office of broker has been vastly extended by the increasing exigencies of commercial business.

The most important kinds of brokers are here enumerated. Bill and note brokers negotiate the purchase and sale of bills of exchange and promissory notes. They are paid a commission by the seller, and it is not their custom to disclose the names of their principals. There is an implied warranty that what they sell is what they represent it to be, and should a bill or note sold by them turn out to be a forgery, they are held to be responsible; but it would appear that by showing a payment over to their principals, or other special circumstances attending the transaction proving that it would be inequitable to hold them responsible, they will be discharged. (Edwards, Bills, 291; 4 Duer, 79). The authorities, however, are not in harmony upon this question. (See 3 Allen 258; 1 Hill 287; 21 E. C. L. 379.) Exchange brokers negotiate bills of exchange drawn on foreign countries, or on other places in this country. It is sometimes part of the business of exchange brokers to buy and sell uncurrent bank notes and gold and silver coins, as well as drafts and checks drawn or payable in other cities; although, as they do this at their own risk and for their own profit, it is difficult to see the reason for calling them brokers. Insurance brokers procure insurance, and negotiate between insurers and insured. Merchandise brokers negotiate the sale of merchandise without having the possession or control of it, as factors have. Pawnbrokers lend money in small sums, on the security of personal property, at usurious rates of interest. They are licensed by the authorities, and excepted from the operation of the usury laws. Real estate brokers are those who negotiate the sale or purchase of real property. They are a numerous class, and, in addition to the above duty, sometimes procure loans on mortgage security, collect rents, and attend to the letting and leasing of houses and lands. Ship brokers negotiate the purchase and sale of ships and the business of freighting vessels. Like other brokers they receive a commission from the seller only. Stock brokers are those employed to buy and sell stock in incorporated companies. The stock brokers are associated together in the larger cities under the name of the Board of Brokers.

BROMAL HYDRATE—BROMIDROSIS

(See STOCK EXCHANGE.) This board is an association, admission to membership in which is guarded with jealous care. Membership is forfeited for default in carrying out contracts, and rules are prescribed for the conduct of the business, which are enforced on all members. The purchases and sales are made at sessions of the board, and are all officially recorded and published by an officer of the association. Stock brokers charge commission to both buyers and sellers of stocks.

Bro'mal Hydrate is prepared by adding bromine to iced alcohol, distilling and combining with water. Its crystals resemble those of chloral hydrate in appearance and chemical properties, and are soluble in water. The drug has a sedative action tending to produce sleep, and is employed in nervous conditions and to diminish the attacks in epilepsy. It has little effect on pain, and should not be used when the heart is weak or the stomach upset.

Bro'mamide, a volatile crystalline substance without odor or taste and containing bromine. It is insoluble in water and is employed as a sedative in acute and chronic rheumatism and neuralgia.

Bromberg, bröm-bärn, Prussia, a town in the province of Posen, 69 miles northeast of the city of that name; situated on the Brahe six miles west of its confluence with the Vistula. It is well built, has two Protestant and two Roman Catholic churches, a synagogue, asylum for the blind, a gymnasium, and a real-gymnasium. Pop. about 50,000.

Brome, Alexander, English poet and dramatist: b. 1620; d. 1666. He seems to have been a lawyer by profession, and at one time attorney to the court. He is best known as the author of many royalist songs and epigrams. He published 'The Cunning Lovers,' a comedy (1654); 'Fancy's Festivals' (1657); 'Songs and Poems' (1661); 'Translation of Horace' (1666).

Brome, Richard, English dramatist: d. about 1652. He was at first the servant and afterward the friend of Ben Jonson, who encouraged him in his literary work, and on whose style his plays are modeled. The best and most popular of his dramas, some of them comedies dealing with the everyday life of his time and others of a more romantic character are: 'The Court Beggar' (acted 1632); 'The Love-sick Court' (published 1659); 'The Queen and Concubine' (published 1659); 'The Northern Lass' (printed 1632); 'The Sparagus Garden' (acted 1635); 'The Antipodes' (acted 1638), and 'A Jovial Crew' (acted 1641).

Brome-grass, the common name of the genus *Bromus*. Nearly 200 species have been described, occurring in both the Old and the New World. They are known by having their spikelets many-flowered, two awnless glumes to each floret, two paleæ or valves, the lowermost of which has a rough, straight, rigid awn proceeding from below the tip of the valve. These grasses have great power of resisting drought, and have proved themselves valuable forage plants on the high, dry plains of the western United States. Some species are cultivated for hay in the eastern States, but are not much relished by cattle. The giant brome-grass is known as cheat or chess, and is found in wheat-fields. This has been introduced from Europe.

Bromelia, a genus of about 25 species of monocotyledonous, stemless herbs of the natural order *Bromeliaceæ*, natives of tropical America, introduced into other warm climates for the sake of the fibre obtained from their leaves, and cultivated in greenhouses to some extent for ornament. The species have stiff leaves like the pineapple, and flowers in panicles. *B. pinguin*, the wild pineapple or pinguin, a native of the West Indies, is perhaps best known because of its use as a tropical hedge-plant, for which its numerous sword-shaped, spiny, rigid leaves, three to six feet long, and two inches wide, specially adapt it. The leaves are also ornamental, being bright green at first and turning red with age. The reddish pubescent flowers in compact panicles are followed by edible fruits as large as plums. These fruits are used to make a pleasant cooling drink. *B. sylvestris*, which has smaller leaves, furnishes a fibre said to be superior to the preceding species. Other species also yield a fibre of greater or less value.

Bro'mic Acid (HBrO_3), a monobasic acid, forming salts called bromates. When bromine is dissolved in caustic potash a mixture of bromide and bromate of potassium is obtained, which can be separated by crystallization, $3\text{Br}_2 + 6\text{KHO} = 5\text{KBr} + \text{KBrO}_3 + 3\text{H}_2\text{O}$. Free bromic acid can be prepared by passing chlorine into bromine water, $2\text{Br} + 10\text{Cl} + 6\text{H}_2\text{O} = 2\text{HBrO}_3 + 10\text{HCl}$. The acid is best obtained by decomposing potassium bromate by argentic nitrate, and acting on the resulting argentic bromate by bromine, $5\text{AgBrO}_3 + 3\text{Br}_2 + 3\text{H}_2\text{O} = 5\text{AgBr} + 6\text{HBrO}_3$. Bromic acid is a strongly acid liquid, reddening and then bleaching litmus paper. On concentration at 100° it decomposes into bromine and oxygen. It is decomposed by sulphur dioxide (SO_2), by sulphide of hydrogen (H_2S), and by hydro-bromic acid (HBr). Bromates are with difficulty soluble in water, and are decomposed on heating into oxygen and bromides.

Bromide, brō'mid, a combination of bromine with a metal or a radical. Bromides are soluble in water, except silver and mercurous bromides; lead bromide is very slightly soluble. They are detected in analysis by the following reactions: Argentic nitrate gives a yellowish precipitate of AgBr , insoluble in dilute nitric acid, and soluble in strong ammonia. Chlorine liberates bromine, and, if the liquid is shaken up with ether, a yellow ethereal solution floats on the liquid. Heated with sulphuric acid and MnO_2 , bromides yield vapors of Br , which turns starch yellow.

Bromidro'sis (bromos, a bad odor + hidros, sweat), malodorous or stinking perspiration, usually excessive in quantity and due mostly to bacterial decomposition of the sweat. The parts most affected are the arm-pits and the feet, but the latter are not attacked in persons who go barefoot. The victims are mostly anæmic, nervous persons. Very hot water, formaldehyde, salicylic acid, and boric acid are the most used applications, the latter being dusted in shoes and stockings. The sweat also sometimes smells of certain odoriferous substances, not necessarily offensive, which have been taken; for example: asafœtida, copaiba, denzoic acid, musk, onion, or garlic. It also may develop a peculiar odor in cholera, smallpox or typhoid fever, and smell

BROMINE — BRONCHITIS

of urine in uremia. Rarely it gives a pleasant odor of violet or pineapple. The sweat in some colored races has a distinctive, unpleasant smell.

Bro'mine, a non-metallic element. Symbol Br; atomic weight, 79.4 for $H=1$, or 80.0 for $O=16$. Bromine was discovered in 1826 by Balard, in the salts obtained by the evaporation of sea water. Bromine is liberated from the sodium and magnesium salts by the action of free chlorine, and is separated by ether, which dissolves the bromine. This red-colored solution is removed, saturated with potash, evaporated, and heated to redness, and the bromide of potassium is heated with manganese dioxide and sulphuric acid. The bromine is liberated in the form of a deep red vapor, which condenses into a dark, reddish-black liquid. Specific gravity, 2.97. It boils at 63° , and its vapor density is 5.54 times that of air. It has an irritating smell, and when inhaled is poisonous. It dissolves in 30 parts of water, and the solution has weak bleaching properties. Bromine and hydrogen do not unite in the sunlight, but do when they are passed through a red-hot porcelain tube, forming hydrobromic acid (HBr), which is also obtained by the action of phosphorus and water on bromine. It is a colorless, fuming gas, which liquefies at 73° , very soluble in water. The concentrated solution contains 47.8 per cent of HBr; it boils at 126° , and has powerful acid properties; it neutralizes bases, forming bromides and water. Hypobromous acid, $HBrO$, is only known in solutions; it has bleaching properties. Bromine can displace chlorine from its compounds with oxygen, while chlorine can liberate bromine from its compounds with hydrogen. Free bromine turns starch yellow.

Bromine has been applied externally as a caustic but rarely. Its chief official preparations are bromide of ammonium, useful in whooping-cough, infantile convulsions, and nervous diseases generally; and bromide of potassium, now very extensively used, especially in epilepsy, hysteria, delirium tremens, diseases of the throat and larynx, bronchocele, enlarged spleen, hypertrophy of liver, fibroid tumors, etc. Also, as an antaphrodisiac, for sleeplessness, glandular swellings, and skin diseases. The alterative properties of bromide of potassium are similar to, but less marked than, those of the iodides. Its preparation is the same as iodide of potassium, substituting an equivalent quantity of bromine for iodine — $6KHO + Br_2 = 5KBr + KBrO_3 + 3H_2O$. It has a pungent saline taste, no odor, and occurs in colorless cubic crystals, closely resembling the iodide. As a hypnotic its usefulness is much increased by combining it with morphia or chloral hydrate.

Bro'mipin, a yellow, bland liquid of simple oily taste, and composed of oil of sesame with 10 per cent of bromine. It is easily borne by the stomach and does not readily produce bromism, therefore in some cases it is substituted for the bromides which it resembles in its action on the nervous system.

Bro'mism, a condition which results from the accumulation of bromides in the system, owing to the ingestion of greater quantities than the body can get rid of. The breath is fetid, the skin breaks out in an acne eruption, the throat is insensitive to touch so that it may be tickled with a feather, and there is loss of memory,

heaviness of intellect, great sleepiness, and depression of spirits. If the drug is still continued there may be paralysis, loss of sight and hearing, inability to speak above a whisper, and various symptoms of mental derangement. The symptoms usually quickly subside on stopping the drug.

Bromley, England, a town of Kent, 10 miles south-southeast of London. It has a market square with a large market-house, and has rapidly increased by the erection, in its vicinity, of large groups of houses occupied by London merchants. The most notable place of worship is the modern church of St. Peter and St. Paul.

Bro'moform, a clear, heavy, volatile liquid of ethereal odor and sweetish taste, soluble in alcohol or ether though not in water. It is analogous to iodoform and chloroform, and is made like the latter from alcohol or acetone. It is somewhat anesthetic and has been used like chloroform, but its special use is in "whooping-cough," in which a few drops are given in solution or mixture several times a day.

Bro'mol, the precipitate formed when bromine water is added to a solution of carbolic acid. It occurs in crystals, is antiseptic, and may be taken internally for diarrhoea or cholera morbus, or applied to wounds or ulcers in the form of a salve.

Brompton, England, a suburban district of London, in Kensington, associated with the names of Burke, Canning, and other eminent men.

Bromus. See BROME GRASS.

Bromvogel, the South African name for the hornbill (q.v.).

Bronchi, brông'ki, the two branches into which the trachea or windpipe divides in the chest, one going to the right lung, the other to the left, and ramifying into innumerable smaller tubes—the bronchial tubes. See LUNGS.

Bronchitis (Gk. bronchia, the bronchial tubes + itis, a suffix denoting inflammation), inflammation of the bronchi. Acute bronchitis is a "cold in the chest," and may be simple or may accompany typhoid fever, malaria, influenza, whooping-cough, or tuberculosis. It is very common in young children, in the aged, and in those whose work involves the inhalation of fumes or dust. Sedentary indoor occupations and overheated rooms are predisposing conditions. In some people the bronchi are very susceptible, and "catching cold" means an attack of bronchitis. The mucous membrane of the bronchi is red, swollen, and inflamed, and after the first day or two exudes large quantities of mucus which must be coughed up. There may be a sudden onset with pains in the back and limbs, a feeling of languor and restlessness, tightness or pain in the chest, and fever. The cough is at first dry, but soon is accompanied by much sputum. Often the symptoms are very slight, lasting only a day or two, but the usual duration is one or two weeks. Complete return to health may be much delayed. In infants and old people pneumonia frequently supervenes. At the onset a hot foot-bath, hot lemonade to produce free sweating, a mustard plaster to the chest, and a cathartic may cut short an attack. Later ipecac, senega, squills, ammonia, etc., are



A PITCHING BRONCHO.

BRONCHOCELE—BRONSART

given to loosen the mucus and relieve the congestion. Codeine will allay the cough. Chronic bronchitis occurs most frequently in middle life or old age, and commonly accompanies disease of the heart, liver or kidneys, and gout. Cold and changeable weather brings on the symptoms year after year, so that a person will "take cold every time the weather changes." The mucous membrane is atrophied, or in places thickened, and the tubes are irregularly dilated. There may be shortness of breath on exertion, asthmatic attacks, spells of coughing, profuse expectoration, and occasionally spitting of blood. Fever is rare. The general health is not impaired to the extent that it is in tuberculosis, but a change to a dry, bracing climate may be advisable. Turkish baths, creosote, ipecac, and potassium iodide are among the favorite remedies. A form of acute or chronic bronchitis, in which membranous casts of the bronchial tubes are formed and coughed up, is known as fibrinous bronchitis. Consult Ailbut's 'System of Medicine'; and Osler's 'Principles and Practice of Medicine.'

Bronchocele, bröng'kô-sêl, an indolent tumor on the forepart of the neck, caused by enlargement of the thyroid gland, and attended by protrusion of the eyeballs, anæmia, and palpitation.

Bronchotomy, bröng-kôt'ô-mî, in surgery, an incision into the windpipe or larynx, between the rings, to afford a passage for the air into and out of the lungs when any disease prevents respiration in the usual way, or to extract foreign bodies which have got into the trachea, or in cases of suffocation, drowning, etc. It is known as tracheotomy or laryngotomy, according as the windpipe or the larynx is operated on.

Bronco, or **Broncho**, the small horse of the plains in western United States and in Mexico. In Texas it is called "Mustang." It is descended from the horses of Arabian stock, brought to America by the early Spaniards, and exhibits still certain Arabian features due to this ancestry. Many of the Spanish horses were captured by the Indians, and some escaped from their owners. Of the former, great numbers deserted their Indian captors, and roamed with their free companions over the plains of the Southwest, where they multiplied rapidly, and adapted themselves to the local conditions of climate and vegetation. Thus they returned to a wild state in this country, which has been considered as the original habitat of the horse family, but which presents nowhere, unless on the pampas of South America, an aboriginal type of horse. These wild horses have more recently been captured, and bred in captivity; and have been modified by admixture of blood with horses from the eastern United States. They are famous for their endurance, despite their rather weak hind quarters. Their heads are proportionately very large, and not handsome, but the little animals are extremely intelligent and serviceable.

Brondel, John B., American clergyman: b. Bruges, Belgium, 1842. He studied in the American College of the University of Louvain and was ordained to the Catholic priesthood in 1864. He came to America and from 1867-77

was rector at Steilacoom, Wash., and at Walla Walla, 1877-8. In 1879 he became bishop of Vancouver Island, and was appointed, in 1883, administrator apostolic of Montana, becoming later bishop of Helena. Bishop Brondel is especially known for his labors among the Indians.

Brongniart, Adolphe Théophile, â-dôlf tâ-ô-fêl brô-nyâr, French botanist, son of Alexandre Brongniart: b. Paris, 14 Jan. 1801; d. there, 19 Feb. 1846. He first studied medicine, and received his diploma of doctor of medicine in 1826; but afterward turned his attention to the physiology of plants and antediluvian phytology. In 1834 he was elected a member of the Academy of Sciences, as successor to Desfontaines; and in 1839 professor of botany at the Museum of Natural History in Paris. His researches were various, and among his numerous works are 'Histoire des végétaux fossiles' (1828-47); 'Essai d'une classification naturelle des champignons' (1825); 'Mémoire sur la structure et les fonctions des familles' (1871).

Brongniart, Alexandre, â-lêks-ândr, naturalist and mineralogist: b. Paris, 5 Feb. 1770; d. there, 7 Oct. 1847. He turned his attention at a very early age to the study of the ceramic art; and after having served for some time in the army on the medical staff, was appointed, in 1800, director of the porcelain manufactory at Sèvres, where he revived the art of painting on glass. In 1807 appeared his 'Traité Élémentaire de Minéralogie'; and about the same time his labors in the department of natural history brought him into contact with Cuvier, whom he aided materially in classifying the newly discovered fossils of Montmartre. Along with Cuvier he engaged in the composition of the 'Essai sur la Géographie Minéralogique des Environs de Paris,' first published in 1811, and afterward in 1822, much enlarged, under the title of 'Description Géologique des Environs de Paris.' In 1844 appeared his 'Traité des Arts Céramiques.' He succeeded Haüy as professor of mineralogy in the Museum of Natural History in 1822.

Broni, brô'nê, a town of northern Italy, with mineral springs, 11 miles southeast of Pavia. Near by is the castle of Broni, where Prince Eugène obtained a victory over the French in 1703.

Bronn, Heinrich Georg, hîn-rîn gâ-ôrñ brôn, German naturalist: b. Ziegelhausen, 1800; d. 1862. He was educated at the University of Heidelberg, where he was nominated professor in 1833, and appointed lecturer on zoology in succession to Leonhard. Among his various scientific works may be named 'A System of Antediluvian Zoöphytes' (1827); 'Let hæa Geognostica,' an important geological work (1837); 'History of Nature' (1841-9); and 'Universal Zoölogy' (1850).

Bronsart, Hans von, hänts fôn brôn-sâr (properly SCHELLENDORFF, HANS VON BRONSART), German musician: b. Berlin, 1830. He studied in Berlin and Weimar, becoming a pupil of Liszt. After tours to European cities he directed concerts in Berlin. From 1867-87 he was intendant of the Royal Theatre in Hanover, and from 1887-95 filled a similar position in Weimar. His compositions for the piano are among the best known of his works. He wrote also the orchestral pieces, 'Christnacht' and 'Frühlingsphantasie.'

BRONTE

Bronte, brôn'tā, Anne (Acton Bell). See **BRONTE, CHARLOTTE, EMILY AND ANNE.**

Bronte, Charlotte, Emily, and Anne, English novelists. Their father, Patrick Brontë (1777-1861), belonged to a family of Irish protestants named Prunty or Brunty. He was born in the village of Emdale, in County Down, Ireland. By schoolmastering he earned money enough to take him to the University of Cambridge, where he graduated B.A., at Saint John's College, in 1806. Ordained the same year to a curacy in Essex, he subsequently migrated to Yorkshire, and in 1811, obtained the living of Hartshead-cum-Clifton, to the east of Halifax. There he met his future wife, Maria Branwell of Penzance, then on a visit to her friends in the north. They were married on 29 Dec., 1812. Both husband and wife, it is interesting to note, had a zest for writing. A little manuscript in Mrs. Brontë's hand is still extant; and Mr. Brontë published between 1811 and 1818 two volumes of meditative verse and two didactic stories, one of which follows the lines of Richardson's 'Pamela.' In 1815 Hartshead was exchanged for Thornton, another small parish near Bradford, in a bleak and lonely district. To this new home the Brontës brought with them two children, Maria and Elizabeth. At Thornton were born Charlotte (21 April 1816), Patrick Branwell (26 June 1817), Emily Jane (30 July 1818), and Anne (17 Jan. 1820).

A month after the birth of their last child, the Brontës moved to Haworth, near Keighley, a village that then consisted mainly of a street of gray stone houses running irregularly up a hillside by the church and the graves to the parsonage near the summit. As perpetual curate of the parish, the elder Brontë there passed his life; and there the children all grew up within sight of the broad and sweeping moors, wild and bleak in winter but grand and glorious in summer. Mrs. Brontë, a frail woman like her daughters, died in September, 1821, worn out by the birth and care of six children; and the next year, Miss Branwell, an unmarried sister, came to Haworth to manage the household with the aid of the faithful old servant "Tabby." After the death of his wife, Mr. Brontë, always eccentric and austere, grew morose; and Miss Branwell seems to have been rather prim and reserved. Wherefore the children were left much to themselves. In 1824 the daughters were placed in a school at Cowan Bridge, a hamlet on the road between Leeds and Kendal, where they remained for about a year to their great discomfort. Just after leaving school Maria and Elizabeth died of consumption, brought on, Charlotte thought, by bad food and brutal treatment.

Soon after this, Charlotte, Emily, and Branwell—for so they always called their brother—began to write "original compositions" in a curious microscopic hand, which they stitched into booklets and covered with brown paper. The specimens of Charlotte's stories, such as 'The Adventures of Ernest Alembert,' which have been printed as literary curiosities, show a facile pen and a remarkable command of vague and ornate phrases. She, and no doubt Emily and Branwell, had been reading Scott and the Gothic romances. In January, 1831,

Charlotte was sent to a school kept by Margaret Wooler at Roehead, between Leeds and Huddersfield. Though she remained there but a year, she formed a strong attachment for Miss Wooler and several of the girls, especially for Ellen Nussey, with whom she kept up a life-long correspondence. In 1835, she returned to Roehead as a teacher, in company with Emily as a pupil. After three months Emily became homesick and her place was taken by Anne. Charlotte stayed on with Anne till Christmas, when both returned to Haworth. Charlotte was completely worn out by the work for which she was ill adapted. During the next years Emily remained at home, while Anne and Charlotte went out as governesses. Charlotte had a hard time of it in her first position, but received better treatment on a second trial in 1841. In the meantime, she rejected two offers of marriage. With a view to setting up a school of their own, Charlotte and Emily went over to Brussels in 1842 to prepare themselves, especially in French and German, at the Pension Héger, a large school under the management of M. Paul Héger and his wife. They advanced rapidly in their studies, receiving high praise from their master. Called home within a year by the death of Miss Branwell, Emily remained with her father, but Charlotte returned for a year as teacher of English. Homesickness and anxiety for her father, whose eyesight was failing, brought Charlotte back to the parsonage. Brief as was the sojourn abroad, it was of the greatest value to the sisters. Without that experience, neither of them would likely have written novels that are still read.

In 1846, Charlotte, Emily, and Anne published jointly a volume of 'Poems' under the names of Currer, Ellis, and Acton Bell. The little volume was hardly noticed, though it contained Emily's fine stanzas on the 'Old Stoic.' At this time each of the sisters was getting ready a novel. After travelling from publisher to publisher, Emily's 'Wuthering Heights,' and Anne's 'Agnes Grey' were accepted, and published together in December, 1847, under the authors' pseudonyms, and "on terms somewhat impoverishing." Fifty pounds was advanced to Newby, the publisher, on account and never returned. Charlotte's 'Professor,' which became detached from the other two novels in the long journey, was everywhere rejected; but Smith and Elder intimated to her that they were willing to consider "a novel of a more striking and exciting character." 'Jane Eyre,' by Currer Bell, already completed, was at once accepted and published in October, 1847, two months before her sisters' novels came out. In January, 1848, it went into a second edition with a dedication to Thackeray. Charlotte Brontë at once took her place among the great novelists of the period.

The next year appeared Anne's second novel, the 'Tenant of Wildfell Hall.' By this time sorrow and death were settling over the Yorkshire parsonage. Branwell, who had started out in life with the intention of becoming a portrait painter, fell into evil ways and slowly degenerated through long years under the eyes of his sisters. After several attacks of delirium



From the drawing by Richmond

CHARLOTTE BRONTË

BRONTË

tremens, the end came in September, 1848. When he felt the approach of death, he rose to his feet and died standing in order to prove that as long as there is life there is strength of will to do as one chooses. Emily drooped and died on 19 December, refusing to see a physician till just before the end. Among the poems she left unpublished were the memorable 'Last Lines,' and several other stanzas which Matthew Arnold justly placed by the side of Byron's poems for vehemence, passion, and pain. Anne, long in declining health, was taken over to Scarborough where she died of consumption on 28 May 1849, within sight and sound of the sea she passionately loved. She lies buried in the Scarborough churchyard. Like Emily, she also left behind "last verses" in a noble but more subdued key. Charlotte lived on with her father in great loneliness, publishing 'Shirley' in 1849 and 'Villette' in 1853. She visited London several times, and on two occasions she met Thackeray, with whom she was greatly puzzled. To Mrs. Elizabeth Gaskell the novelist, who made her acquaintance among the lakes of Westmoreland in 1850, she seemed like one from whom suffering had taken "every spark of merriment" and "to be shy and silent from the habit of extreme, intense solitude." After a courtship of some years, broken off by her father, she married on 19 June 1854, the Rev. Arthur Bell Nicholls, who had served as curate at Haworth. Her married life, which promised much happiness, was brief. She passed a few months on her husband's estates in Ireland and then returned to Haworth to die on 31 March 1855. She was buried in the church by the side of Emily and Branwell. Two years after her death, the 'Professor,' nine times rejected, was published with a note by Mr. Nicholls. The fragment of a story called 'Emma,' which had been begun in 1854, appeared in *Cornhill Magazine* for April 1860, along with Thackeray's beautiful tribute under the title of the 'Last Sketch.' Settling permanently in Ireland, Mr. Nicholls died there in 1906.

A glamour rests over these children of an Irish clergyman who had strayed to the Yorkshire moors. What Charlotte said of Emily and Anne may be said of herself also: "For strangers they were nothing; for superficial observers less than nothing; but for those who had known them all their lives * * * they were genuinely good and truly great." In them all, except perhaps Charlotte, lurked consumption; and they all died young. Two were endowed with unusual talents and two were geniuses. Much, no doubt, that has been reported of Branwell is legendary, but he certainly possessed the Brontë taste for art and letters. A beautiful reproduction of his portrait of Emily was engraved from a photograph for the Haworth edition of 'Wuthering Heights' (1900). At one time he aspired to win a name in literature. A letter of his to Wordsworth, inclosing a few stanzas of verse and asking for the poet's opinion of them, is as pathetic as remarkable in tone and style. "From the day of my birth," he said, "to this the nineteenth year of my life I have lived among secluded hills, where I could neither know what I was or what I could do. I read for the same reason that I ate or

drank, because it was a real craving of nature. I wrote on the same principle as I spoke—out of the impulse and feelings of the mind; nor could I help it, for what came, came out, and there was the end of it."

That pressure of utterance which opium and alcohol brought to naught in this case, was characteristic of the sisters. They wrote because they could not help it. Anne possessed less of the Brontë fire. Fragile and gentle like her mother, she was "the prettiest * * * with light brown hair, violet eyes, and pencilled eyebrows." Without the outlook that came to Emily and Charlotte from their stay abroad, she moved in the narrowest circle of experience easily imaginable. Her novels, in consequence, suffer much by comparison. They are, however, storehouses of biographical incident relating to the family, and for themselves they are interesting, notwithstanding their crudeness, as transcripts of Yorkshire ways and manners at a time when the daughters of clergymen were forced to become governesses.

Emily's genius towered far above the rest. Of the poems the sisters published together, only hers cling to the memory. Under more favorable surroundings she should have become a poet ranking with Christina Rossetti and Mrs. Browning. One may pick flaws enough in 'Wuthering Heights.' It is ill put together and perhaps the author has not fully realized her aim. It is no doubt brutal where it was intended not to be. But it displays the same intense power of utterance as the poems. It is one of the great things in English fiction, not much like any romance before or since its time. Over it hangs the mystery of the moors and their solitary wanderer.

'Wuthering Heights,' however, has never gained the popularity of Charlotte's novels. To many it is nightmarish and repellent. It is not softened by the humanity of Charlotte who mingled more with the world. 'Jane Eyre' was based upon Charlotte's experiences as school-girl and governess. As a picture of the life of the times in the north, it came as a startling revelation. Its characters were drawn on hard and unconventional lines totally unlike the run of novels women were then writing. Against the author was brought the charge of coarseness and brutality, though no mind was ever cleaner than hers. The novel was really the wail of a human soul compelled to haunt the Yorkshire moors. 'Shirley' was quieter in tone; but it caused a stir in the north, for the characters were easily recognized portraits, among which was a superb study of Emily as Shirley Keeldar of quivering lip, dilating nostrils, and wild, fascinating eyes, when moved to passion or strange, Titanic visions. 'Villette,' which is the 'Professor' worked over, was founded on Charlotte's life in Brussels. Though it suffers somewhat from its foreign setting, it is perhaps her masterpiece. Lucy Snowe and Paul Emanuel are her most elaborate characters, and nowhere else has Charlotte Brontë so subtly analyzed states of mind verging into madness.

Bibliography.—'The Life of Charlotte Brontë' by Mrs. Elizabeth Gaskell (London 1857, afterwards revised and frequently reissued) is among the finest biographies in the English language. It should be supplemented, however.

BRONTOTHERIUM — BRONZE AGE

by C. K. Shorter, 'Charlotte Brontë and her Circle' (London 1896) and 'Charlotte Brontë and her Sisters' (New York 1905). Interesting but less valuable biographies of Charlotte Brontë have been written by T. W. Reid (London 1877), and A. Birrell (London 1887). Consult also 'Emily Brontë' by A. Mary F. Robinson in the 'Eminent Women Series' (Boston 1883); Swinburne's 'A Note on Charlotte Brontë' (London 1877); F. A. Leyland's 'The Brontë Family' (London 1886); Wright's 'The Brontës in Ireland' (New York 1893); and the 'Publications' of the Brontë Society. The 'Life and Works of the Sisters Brontë' with a preface by Mrs. Ward, and introduction and notes to Mrs. Gaskell's 'Life' by C. K. Shorter (7 vols. London and New York 1899-1900) is the best complete edition yet published. Charlotte Brontë's 'Adventures of Ernest Alembert' is included in Nicholl and Wise, 'Literary Anecdotes of the Nineteenth Century' (Vol. II. London 1896).

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Brontothe'rium, or **Titanotherium**, a genus of the extinct mammals first found in the Bad Lands of South Dakota, and later in Nebraska and Colorado. The formation is Miocene and the genus is but one of an extinct family of herbivorous mammals. It had the following features: The skull was long and depressed, with a large pair of horn cores, placed transversely on the maxillary bones, in front of the orbits; the nasal bones, which were greatly developed and firmly co-ossified, protruded over the narial orifice; the brain cavity was small and did not extend over the cerebral hemispheres or the cerebellum, and but little over the olfactory lobes; the neck was of medium length and stout; axis was large and extended transversely, being massive, with odontoid process stout and conical; lumbar were slender and not as large as the dorsals, and there were four sacral vertebrae; a long and slender tail, indicated by the caudals; limbs somewhat shorter than the elephant's; radius separated from the ulna; carpal bones short and supporting four toes; tibia separated from the fibula; three toes of almost equal size on the hind foot.

Bronze, an alloy consisting of proportions of copper and tin, varying according to the purpose desired, to which lead, zinc, and silver also, are sometimes added for the purpose of giving greater brilliancy to the compound, or rendering it more fusible, the zinc being introduced in the form of brass. In some of the modern bronzes, brass is used instead of tin; these are then nothing more than brass, consisting of very large proportions of copper. Bronze was used by the ancient Assyrians and Egyptians. Layard brought many ornaments and other articles of this metal from Assyria. It is more fusible, as well as harder than copper, and has also a fine-grained metal, taking a smooth and polished surface; hence its universal use, both in ancient and modern times, in making casts of all kinds, medals, bas-reliefs, statues, etc. Its color is a reddish-yellow, and is darkened by exposure to the atmosphere. It has been found, on examination, that the bronze weapons of the Greeks and Romans were of the best composition for securing the greatest density in the alloy, and

the cutting edges were brought to the highest point of tenacity by hammering. Gun-metal consists of about 90 parts of copper to 9 or 10 of tin. Old cannon are frequently used for casting statues, for which the proportions are similar. Bell-metal consists of 78 of copper and 22 of tin. For edge-tools — copper, 100 parts; tin, 14. For medals — copper, 89; tin, 8; zinc, 3, are used. For ornamental articles, zinc and lead are frequently added. These four metals are usually contained in the bronzes of France. There is some difficulty in making bronze, from the liability to the loss of tin, zinc, etc., by oxidization. A greenish color is imparted to ancient bronzes by oxidization, which is imitated in modern bronzes by chemical appliances. An alloy called phosphor-bronze, consisting of about 90 per cent of copper, 9 of tin, and from .5 to .75 of phosphorus has been found to have peculiar advantages for certain purposes. The addition of phosphorus increases the homogeneity of the compound, and by varying the proportion of the constituents, the hardness, tenacity, and elasticity of the alloy may be modified at pleasure. Great hardness and tenacity with little elasticity can be conferred on it for the making of ordnance, and hardness and tenacity combined with permanent elasticity can be given to it for the making of parts of machines, etc. In the elastic condition it is peculiarly well adapted for the bearings of machinery, since it produces very little friction. The addition of phosphorus has another important effect. When the proportion exceeds .5 per cent it gives a warmer color to the bronze, making it resemble gold largely alloyed with copper. This form of the alloy is therefore largely used for works of art. The name of steel-bronze is given to bronze condensed and hardened artificially, as in the making of cannon the bore of which is enlarged by forcing in several strong steel cylinders of different sizes in succession. Aluminum-bronze is a gold-colored alloy of copper and aluminum, manganese-bronze, a bronze containing manganese and iron, possessing valuable properties. See BRONZES.

Bronze Age, the period represented by archaeologists as intervening between the Stone Age and the Iron Age. The demarcations of these periods, however, are far from being clearly defined, and overlap to some extent. The use of stone for weapons, utensils, etc., naturally preceded the use of metals by primitive man, and the order in which the different metals would come into service would depend upon several factors. The nearness of the metallic deposits to the surface of the earth, the relative degree of purity in which they are usually found, and ease in smelting and working, would all affect the sequence of their introduction. The study of the traces of the Bronze Age in Europe apparently leads to the conclusion that throughout that continent the introduction of copper and its alloys was nearly synchronous, but the transition to the Iron Age took place more or less slowly in different regions, the new metal being introduced from the south and superseding bronze soonest where the paths of early commerce were most numerous or most frequently trodden. In Great Britain and Scandinavia the Bronze Age lingered much longer, according to certain archaeologists, than in Italy, France,

MODERN BRONZE WORK.



BRONZE WING—BROOK FARM

and Spain. In Greece, the use of bronze distinguishes the Mycenaean period, especially in its earlier days. In the New World, especially in Peru, the existence of the Bronze Age is indicated. The chronology of the three ages presents marked difficulties, and the periods should be regarded as stages of evolution in civilization still exemplified among races of slow development. The Bronze Age in Europe may be approximately placed between 2000 B.C. and 1800 B.C.

Bronze Wing, Bronzewing Pigeon, or Bronze Pigeon, any of several different species of the genus *Phaps*, found in Australia, Tasmania, and New South Wales. These are birds of beautiful plumage, obtaining their name from the lustrous bronze color with which the wings are variously marked. The most familiar species is the "common bronzewing" (*Phaps chalcoptera*), a plump, deliciously edible bird, weighing about a pound, and distributed throughout Australia. It nests on low branches on trees near swamps. The "brush bronzewing" (*P. elegans*) of southern Australia and Tasmania, is a groundkeeping bird and resembles a partridge in its habits. Another species is the "harlequin bronzewing" (*P. histrionica*), found in great flocks in the northwestern part of New South Wales. Sometimes the ground-pigeons of the genus *Geophaps* are called "bronzewings."

Bronzes, in archæology, works of art cast in bronze. Egyptian idols of bronze are contained in the British Museum. The most celebrated antique bronze statues are, the 'Sleeping Satyr'; the two youthful athletes; the colossal equestrian statue of Marcus Aurelius, at Rome; the Hercules of the capitol; the colossal head of Commodus; the statue of Septimius Severus in the Barberini Palace. Bas-reliefs, vaults, and doors of public edifices were ornamented with decorations of the same metal. Urban VIII. took from the Pantheon alone 450,000 pounds of bronze, which he used for the ornaments of St. Peter's, and for the cannon of the castle of St. Angelo. One of these was composed wholly of bronze nails taken from the portico, and bore the inscription, *Ex clavis trabibus porticus Agrippæ*. Bronze was considered by the ancients as sacred to the gods; and the Roman emperors who struck gold and silver coins could not strike them of bronze without the permission of the Senate; hence the inscription S. C. (*Senatus consulto*). The words *moneta sacra* are found only on bronze medals. All the instruments of sacrifice and sacred vessels of the ancients were of bronze. (For the method of casting in bronze among the ancients, see Winckelmann's 'History of Art,' book ii.) The moderns have also made much use of bronze, particularly for statues exposed to accidents or the influence of the atmosphere, and for casts of celebrated antiques. The molds are made on the pattern, of plaster and brick-dust. The parts are then covered on the inside with a coating of clay as thick as the bronze is intended to be. The mold is now closed and filled on its inside with a nucleus or core of plaster and brick-dust, mixed with water. When this is done the mold is opened, and the clay carefully removed. The mould, with its core, is then thoroughly dried, and the core secured in its position by bars of bronze, which pass into

it through the external part of the mold. The whole is then bound with iron hoops, and the melted bronze being poured in through an aperture left for the purpose fills the cavity previously occupied by the clay, and forms a metallic covering to the core. It is afterward made smooth by mechanical means.

Bronzing. Bronze of a good quality acquires by oxidization a fine green tint, called *patina antiqua*, or, by the Romans, *ærugeo*. Sal-ammoniac and salt of sorrel dissolved in vinegar, and applied with a soft rag or brush, will produce this result. The process must be repeated several times to have its full effect. The proportions given by Dr. Ure are three fourths of an ounce of sal-ammoniac and a drachm and a half of salt of sorrel to a quart of vinegar. Bronzing is also the process by which a body of plaster, wood, or metal is made to receive a bronze-like surface. Brass castings are bronzed by the application, after cleaning and brightening them, of vinegar and sal-ammoniac. A variety of liquid solutions are prepared for bronzing copper and other metals, in which verdigris, sal-ammoniac, salt of sorrel, cinabar, alum, and common salt are employed. To bronze wood and other articles, waste gold-leaf, ground in with honey and washed, or mosaic gold ground with bone ashes, is applied, with size or oil varnish. Gypsum casts are bronzed with black-lead.

Bronzino, Agnolo, or Angiolo, ăn'yō-lō, or ăn'jē-lō brōn-zē-nō, Italian painter of the Florentine school: b. Monticelli, near Florence, 1502; d. 1572. He was a pupil of Jacopo da Pontormo, and an admirer and imitator of Michael Angelo. One of his best paintings is a Christ in the church of Santa Croce, at Florence.

Brooch, an ornament worn on the dress, to which it is attached by a pin stuck through the fabric. Brooches are of great antiquity, and were formerly worn by men as well as women. They were used by both sexes among the Greeks and Romans, and also in the Middle Ages. Among the Highlanders of Scotland there are preserved, in several families, ancient brooches of rich workmanship and highly ornamented. Some of them are inscribed with characters to which particular virtues were attributed, and seem to have been used as a sort of amulet or talisman.

Brook Farm, a community organized in 1841 near West Roxbury, Mass. Under the leadership of George Ripley and his wife an association was formed with a few stockholders, and a farm of 200 acres was purchased. Among the members of this association were Nathaniel Hawthorne, Charles A. Dana, John S. Dwight, and George P. Bradford; other prominent people connected with Brook Farm were Ralph W. Emerson, Amos B. Alcott, Theodore Parker, George W. Curtis, and Margaret Fuller. The ideal of the association was to promote the reorganization of society in accordance with the principles of co-operation. The life of the community was very simple; every one had some share of the work to do, the rate of pay being practically the same for all kinds of work; and all had a share in the educational advantages and the social enjoyments. There were a number of industrial employments besides the tilling of the farm, and the surplus product was

sold to outsiders. The school was also an important feature, furnishing instruction in all grades, including college subjects; pupils outside the community were received on the payment of a small fee. In 1843 the association, coming under the influence of Albert Brisbane, adopted the organization of the phalanx according to the plan of Fourier, and established the three "primary departments" of agriculture, domestic industry, and mechanic arts; it became also a centre of the Fourierist propaganda. After this change the prosperity of Brook Farm declined rapidly; on 3 March 1846 the new building, the Phalanstery, was burned, and the association finally dissolved in October 1847.

Bibliography.—Codman, 'Brook Farm, Historic and Personal Memoirs'; Frothingham, 'Life of George Ripley'; Noyes, 'History of American Socialisms'; Swift, Lindsay, 'Brook Farm, Its Members, Scholars, and Visitors.'

Brooke, Francis Key, American Protestant Episcopal bishop: b. Gambier, Ohio, 2 Nov. 1852. He was graduated from Kenyon College in his native town in 1874, and entering the Episcopal ministry was successively rector in the Ohio towns of College Hill, Portsmouth, Piqua, and Sandusky; and in St. Louis, Mo.; and Atchison, Kan. In 1893 he was consecrated bishop of Oklahoma and Indian Territory.

Brooke, Henry, Irish dramatist and novelist: b. Rantavan, Ireland, about 1703; d. Burrator, Devonshire, 10 Oct. 1783. He was educated at Dublin University, and began to practice at the bar; but his taste was decided for poetry and general literature, and he came forward as an author by publishing a tragedy called 'Gustavus Vasa,' which was remarkably popular at the time, and was translated into French, though it is now almost forgotten. He wrote several other tragedies, and also several novels, one of which, the 'Fool of Quality,' possesses considerable merit, and was re-published with a preface by Rev. Charles Kingsley. The death of his wife, and the loss of a favorite child, completely broke his spirit, and he lived for a short time in a state of second childhood.

Brooke, Sir James, English rajah, celebrated as the Rajah of Sarawak: b. Bengal, 1803; d. Burrator, Devonshire, 11 June 1868. He was brought at an early age to England, and having completed his education there obtained a cadetship in the Indian army. He distinguished himself in the Burmese war (1826), and subsequently sailed to China. On this voyage there rose in his mind the idea of ridding the Eastern Archipelago from the scourge of piracy, and ameliorating the condition of the inhabitants. Having come into the possession of a large fortune by the death of his father, he bought one of the royal yachts, and set sail for the East (October 1838). Having directed his course to the island of Borneo, he found Muda Hassim, uncle of the king of Borneo, and Rajah of Sarawak, a district on the northwest coast of the island, engaged in suppressing a revolt. The rajah being hard pressed, agreed to make him his successor in return for his assistance. The offer was accepted, Brooke took command of the rajah's army, and speedily reduced the rebels to submission. Being now established in the government, and recognized as Rajah of Sarawak by the sultan of Borneo (1841), he endeavored to induce the Dyak na-

tives to abandon their irregular and piratical mode of life, and to turn themselves to agriculture and commerce. For this end he published a code of laws, establishing free trade and personal equality, and declaring piracy a crime punishable with death. His efforts were wonderfully successful. In conjunction with the British naval commanders he carried on war against the pirates with great vigor. A sum of money was paid by government for the head of each pirate, and under this system the Malay rovers were soon almost extirpated. On his return in 1847, Mr. Brooke was received with general favor, his position was recognized by the government, he received the honor of Knight Commander of the Bath, and was made governor of Labuan, an island near Sarawak which had been acquired by the British. After his return to Borneo he continued to labor as before for the extension of British influence. In 1850 he went as ambassador to Siam, and not long after gave up his post as governor of Labuan. On the outbreak of the war with China in 1857, his residence was suddenly attacked by about 4,000 Chinese, and he himself only escaped by swimming across the river. His adherents soon rallied, however, and at the head of a large body of Malays and Dyaks he drove the Chinese from Sarawak with the loss of half their number. In 1863 he finally returned to England, leaving the government in the hands of his nephew, Charles Brooke. Whatever may be thought of the policy of Sir James Brooke, there can be no doubt as to the benefits derived from it by the people of Sarawak. He established civilization and opened up a trade where previously they had scarcely any existence. Under his administration Sarawak increased from a village of 1,000 inhabitants to a town of 16,000, while the trade increased in the same proportion.

Brooke, John Rutter, American military officer: b. Pottsville, Pa., 21 July 1838. He entered the army as captain in a volunteer regiment on the breaking out of the Civil War in 1861, and resigned in February 1866, with the rank of brevet major-general. He became colonel in March 1879; brigadier-general, 6 April 1888, and major-general, 22 May 1897. After the declaration of war against Spain, he was placed in command of the 1st Provisional Army Corps, and subsequently distinguished himself in the campaign in Porto Rico, and was made a member of the joint military commission to arrange the cession of the island to the United States. On 13 Dec. 1898, he was appointed military and civil governor of Cuba, a post which he held till April 1900, when he was succeeded by Gen. Leonard Wood. On 10 May following, he succeeded Maj.-Gen. Wesley Merritt as commander of the Military Department of the East, with headquarters in New York.

Brooke, Stopford Augustus, English clergyman and author: b. Letterkenny, Donegal, Ireland, 14 Nov. 1832. After a brilliant course at Trinity College, Dublin, he was ordained in the Anglican Church in 1857. From that year till 1859 he officiated as curate of St. Matthew's, Marylebone (London); and in 1876, after having held various other clerical appointments, he became minister of Bedford Chapel, Bloomsbury, where he officiated till his retirement from regular ministerial work in 1894. In 1872 he

BROOKHAVEN — BROOKLYN

was appointed one of the chaplains-in-ordinary to the queen. Having become a Unitarian in his views, he left the Church of England in 1880, but till 1894 still continued to occupy the same pulpit, Bedford Chapel being private property. He has gained a high reputation as a preacher and writer on religious subjects, and also as a poet, but more especially as a literary critic and historian of English literature. His chief works are 'Life and Letters of the Late Frederick W. Robertson of Brighton' (1865); 'Christ in Modern Life' (1872); 'Theology in the English Poets' (1874); 'Primer of English Literature' (1876), an admirable little work; 'Riquet of the Tuft' (1880), a love drama; 'The Early Life of Jesus' (1888); 'Poems' (1888); 'History of Early English Literature: from Its Beginning to the Accession of Alfred' (1892), the only work in English treating adequately its special subject; 'Tennyson: His Art and Relations to Modern Life' (1894); 'The English Poets from Blake to Tennyson' (1894); 'Jesus and Modern Thought' (1894); 'The Old Testament and Modern Life' (1896); 'The Gospel of Joy' (1898); besides several volumes of sermons. His son, Stopford Wentworth Brooke, was pastor of the First (Unitarian) Church in Boston, Mass., 1886-98.

Brookhaven, Miss., a city and county-seat of Lincoln County; on the Illinois C. R.R.; 56 miles south of Jackson, the State capital. It is the seat of Whitworth Female College (Methodist), one of the most popular educational institutions in the South, and St. Francis School (Roman Catholic), and is the trade centre for a large farming, cotton, and yellow pine lumbering region. An electric light and power plant is owned by the city. Pop. (1910) 5,293.

Brookings, S. D., a city and county-seat of Brookings County; on the Chicago & N. R.R.; 60 miles north of Sioux Falls. It is chiefly a dairying place; has electric lights, waterworks, and several mills; and is the seat of the South Dakota Agricultural College and of the United States Experiment Station. Pop. (1910) 3,000.

Brookite, a mineral only known in the form of orthorhombic crystals. It is an oxide of titanium, having the formula TiO_2 . It is found in a variety of colors, red, yellow, black, and brown. It has a hardness of 5.5 to 6.0, and a specific gravity of 3.9 or 4.0. It occurs in Switzerland, in the Tyrol, and in Wales. In the United States it is found (in stout black crystals known as "arkansite") at Magnet Cove, Ark.; also at Paris, Maine, in Ulster County, N. Y., and in North Carolina. The mineral was named for the English mineralogist, H. J. Brooke.

Brooklime (*Veronica Beccabunga*, and *V. americana*), two species of speedwell, perennial plants of the natural order *Scrophulariaceae* common in ditches and wet places in Europe and America respectively, and attractive for their axillary racemes of bluish flowers, for which they are grown in damp places for ornamental purposes.

Brookline, Mass., a town in Norfolk County, on the Charles River, and the Boston & A. R.R.; three miles west of Boston, with which it is connected by electric railroad. It contains the villages of Cottage Farm, Longwood, and Reservoir Station; has a granite town house,

public library (64,000 volumes), and manufactories of electric motors, and philosophical instruments, but is chiefly a place of suburban residence, being the most beautiful and wealthy suburban town in the country. It was first settled in 1634, and was known as "the hamlet of Muddy River" until its incorporation as Brookline in 1705. Consult Bolton, 'Brookline: the History of a Favored Town' (1897). Pop. (1910) 27,792.

Brooklyn, N. Y., the second largest of the five boroughs of New York city. It includes the entire area of the county of Kings and was, until 1898, when it was consolidated with New York, the fourth largest city in point of population in the United States. It covers the western extremity of Long Island, is situated in lat. 40° 41' 50" N., lon. 73° 59' 50" W., and has an area of 77.52 square miles, extending from the East River, an arm of the sea which separates it from the borough of Manhattan, the old city of New York, to the Atlantic Ocean and to Newtown Creek and Queens County on the east. Its extreme length from Newtown Creek to Brighton Beach, on the Atlantic shore, is 11 miles, and its average width is over 7 miles. It appears to have been formed by nature to be the site of a great city, for so many natural advantages are rarely to be found within a similar area for the building up of a great industrial and commercial community. The island of Manhattan is the centre of the business activity of the American metropolis, and it may retain that primacy for all time, but its restricted area limits its capacity and forbids its expansion. The tendency has been for some years to expand skyward and to utilize to the utmost the ground area of the island by the erection of lofty buildings, many of them exceeding 20 stories in height, but there is a limit to expansion in this direction, and there seems no possibility of adding to the amount of Manhattan waterfront available for purposes of commerce, while the high price of land caused by the imperious demands of trade compels those engaged in business in Manhattan to seek their homes elsewhere. Brooklyn has profited during the greater part of its history from this compulsion, and its population has increased at a constantly accelerated ratio as the demands of business have made property more valuable in the older portion of the city. Since 1860 Brooklyn has advanced in population more rapidly than any other American city, although the period of its most rapid growth dates from the opening of the first bridge across the East River in 1883. Brooklyn's large territorial area, much of which is still devoted to market gardening, must, for many years to come, keep the cost of a home within the resources of people of moderate means, especially as regards the outlying sections, which are thoroughly covered by electric railways. The character of the soil and the freedom from any rocky hills makes nearly every foot of ground admirably suited to building purposes. The greater part of the borough is situated at a considerable elevation above tide-water. A low range of sand-hills, from 50 to 200 feet high, runs north and east through its centre, which slopes gently down on both sides to the East River and the Atlantic Ocean. The natural configuration of the site simplifies drainage and other similar municipal problems to a material extent, while the loca-

BROOKLYN

tion of the borough, between ocean, river, and bay, mitigates the extremes of winter cold and summer heat, and makes it a desirable place of residence throughout the year.

Its advantages as a centre of commerce and industry are no less than those which made it famous as a city of homes before its consolidation with the metropolis. Its water-front available for shipping comprises two miles on Newtown Creek, including its basins, and nearly 10 miles on the East River and New York Bay. The construction of large docks, such as those of the Atlantic and Erie basins—the latter being the chief point of entry of the canal barges that bring great cargoes of grain from the distributing centre at Buffalo to the Brooklyn grain-elevators—have largely increased the wharfage facilities of the borough.

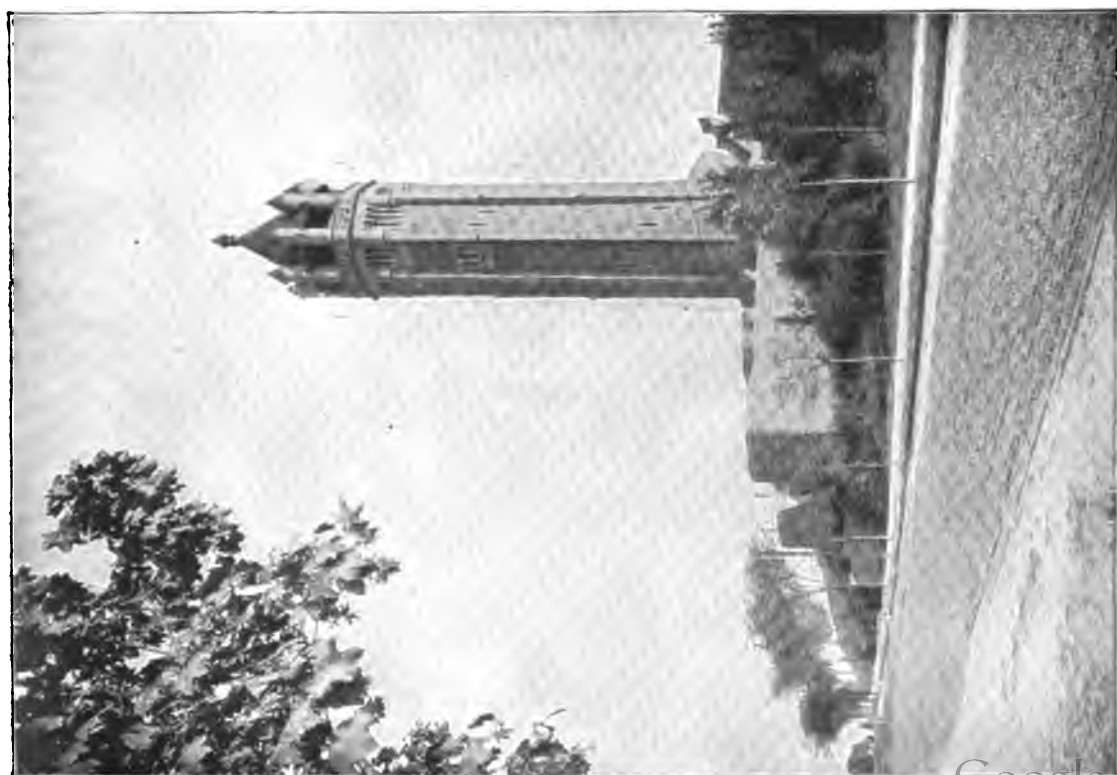
Most large cities grow by the absorption of outlying suburbs and adjacent villages, and in this respect the experience of Brooklyn has been striking. The name of Brooklyn, which was derived from the town of Breucklen, in Holland, the home from which came most of the earliest settlers, was first attached to a small trading-village that grew up on the shores of the East River near what is now the Fulton ferry to Manhattan. There were several other villages in the county which for a long time retained their individuality and developed along their own lines. Across the Wallabout swamp, to the eastward—"Wallabout" being derived from a settlement of Walloons—a village was laid out in 1827 which was incorporated under the name of Williamsburg and in 1851 became incorporated as a city. Then Williamsburg swallowed up the older and adjacent villages of Bushwick and Greenpoint, just as Brooklyn had already swallowed up Bedford and Gowanus. In 1854 Brooklyn and Williamsburg were consolidated. The town of New Lots, including the village of East New York, came next, and the work of absorption, as far as Brooklyn was concerned, was completed in 1894, when the towns of Flatbush, New Utrecht, Gravesend, and Flatlands were made part of the city, the corporate limits of which then included all of Kings County. It was a natural process, but usually, when a large city is surrounded by suburbs that are destined to absorption, the lines of development of the suburbs are indicated and set in accordance with their inevitable destiny, and annexation entails no confusion. It was different with Brooklyn. Williamsburg, Flatbush, Canarsie, Bushwick, and East New York—more than 20 villages and hamlets all told, that are now a part of the borough of Brooklyn—had each its own plan and its own system of nomenclature. The result has been hopeless and to a large extent irremediable confusion. Duplication of street names may be corrected by the substitution of new names for the old, and much has already been done in that direction, but the confusion resulting from the multiplicity of independent plans on which the various parts of the borough were originally laid out have never been wholly corrected, and Brooklyn will continue to be a puzzle to strangers and even to old residents.

It is as a city of homes—of middle-class homes—that Brooklyn has gained its distinctive character among American cities. The

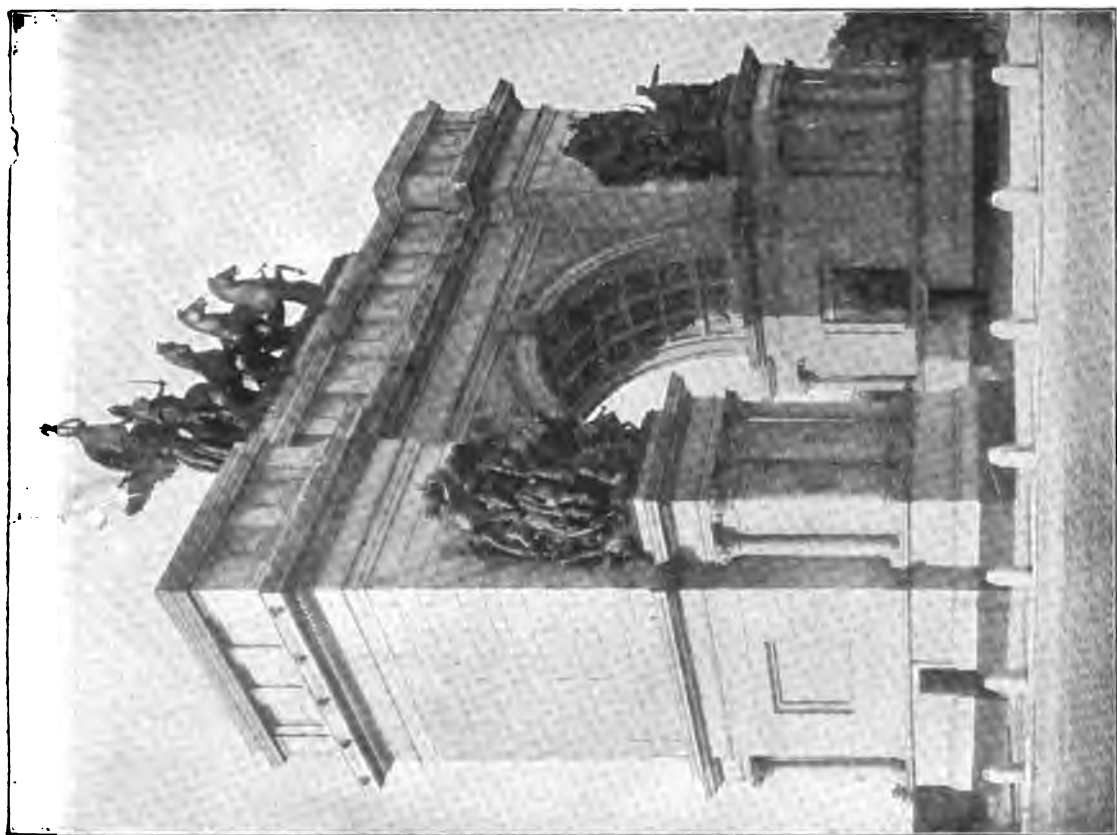
very wealthy can afford to live in Manhattan, and the very poor have no alternative but to crowd into its hive-like tenements, but it may be said that, as a rule, the palace and the tenement—using the latter word in its ordinary, not its technical sense—are alike unknown in Brooklyn. No place of like population is freer from those congregations and nurseries of crime and disease known as "slums," and in no city is a larger proportion of the population housed under decent and sanitary conditions. It is for this reason, and because the growth of Brooklyn has kept pace in other respects with its growth in numbers, that the population increased from 279,122 in 1860 to 599,495 in 1880; 1,166,582 in 1900, and 1,634,351 in 1910.

The earliest settlement of the Dutch in Kings County was made in 1619, but it was not until more than a century later that Brooklyn had any organized existence. It was the scene of Washington's first battle and defeat during the American Revolution. That battle was fought only about six weeks after the American Congress in Philadelphia had adopted the Declaration of Independence. Washington's army, as yet raw and totally unused to warfare, was massed among Brooklyn's hills, while Gen. Howe, with 30,000 seasoned fighting men, occupied Staten Island. The British crossed to Long Island, landing on the plains of New Utrecht, and on the morning of 27 Aug. 1776, a general advance was made on the American lines. The attack was made at three points. One division advanced through the marshes of Gowanus, and, despite a gallant resistance, drove back the Maryland regiment to the main body of American troops. A second point of attack was through what is now known as Battle Pass, in Prospect Park, where the Americans were forced back on the entrenched position at Fort Green, but the heaviest blow was struck through the advance of a strong flanking party. It had early that morning passed along the northern base of the ridge of hills in what is now the Twenty-fourth ward, stopping at the Howard House, a tavern in East New York, and impressing its owner as a guide. It then advanced upon Washington's forces from the east. A misty night fell, with no general engagement, and by morning Washington had withdrawn his troops, under cover of fog, across the East River. The British retained possession of Brooklyn until the evacuation of New York at the close of the war. Brooklyn's most memorable association with Revolutionary history, however, lies in the fact that the British prison ships—the Jersey and its consorts—were moored in Wallabout Bay, and the bones of 11,000 victims of British severity who died in those floating slaughter-pens are buried at Fort Green, where a worthy monument to their patriotic devotion is soon to be erected.

Brooklyn was incorporated as a village in 1801, and at about that time the federal government made its first purchase of land at the Wallabout for navy-yard purposes. The Brooklyn navy yard is now the best equipped in the possession of the U. S. government. It covers an area of over 100 acres, with a capacious dry-dock, and a mechanical plant capable of ship-building on the most extensive scale. Some of the finest ships in the United States navy have been constructed here, and its great repair shops



WATER TOWER AND ENTRANCE TO PROSPECT PARK.



MEMORIAL ARCH, PLAZA ENTRANCE TO PROSPECT PARK.

BROOKLYN

are kept constantly at work. A splendidly equipped naval hospital occupies a fine site in connection with the yard.

Brooklyn village was incorporated as a city in 1834, with George Hall as its first mayor. In 1854 came consolidation with Williamsburg, and thereafter the growth of the city was steady and rapid. Street railway enterprises opened highways through outlying farm districts, and these speedily became transformed into great thoroughfares, and Brooklyn has now 990 miles of streets, of which the principal ones are paved with asphalt.

The surface and elevated railroad lines, all operated by electricity, have 600 miles of tracks, and carry annually about 500,000,000 passengers. The growth of Brooklyn, was largely accelerated by the bridge opened in 1883, and still further stimulated by the completion of the two additional bridges over the East River. The tunneling of the East River, under direction of the New York Rapid Transit Commission, also tended materially toward Brooklyn's further growth.

It has been generally assumed that Brooklyn is merely "the sleeping-place of Manhattan." It is undoubtedly true that many thousands of those who are engaged in business in Manhattan find their homes in Brooklyn,—the number has been estimated at between 100,000 and 200,000; but the fact remains that Brooklyn itself is one of the greatest manufacturing centres of the United States. In many important branches of industry it leads all its competitors. Its most important industry is foundry and machine-shop products. Brooklyn's sugar-refining industry is by far the most important in the United States, nine tenths of the sugar consumed in the country being refined here. Coffee-roasting is another large and important industry as is the manufacture of chemicals. Some of the leading publishers of the United States have located their printing and bookbinding establishments in Brooklyn. It is also the seat of jute manufacture, glass and porcelain factories, cordage works, and other important industries. The following statistics, published by the Census Office in 1911 for the year 1909 will give some idea of the extent of Brooklyn's manufactures: Establishments, 5,218; capital employed, \$362,337,000; cost of materials used, \$235,132,000; salaries and wages, \$89,474,000; value of products, \$417,223,000; average number of wage-earners employed during the year, 123,883.

Brooklyn's public school system, up to the date of consolidation with New York, held a high place in the esteem of public educators. In 1897 it was merged in the public-school system of the greater city, but it still possesses many of the characteristics that formerly distinguished it, and few if any cities in the world have a better equipped galaxy of public schools. It has six high schools, of which one is devoted to manual and technical instruction, while another is wholly given over to commercial instruction. Its 164 public schools are crowded almost beyond their capacity every day in the school year. Many of the schools in the poorer neighborhoods are kept open during the summer months as recreation schools for the benefit of children who remain in the borough during the ordinary school vacation, and who are taught many things outside of the ordinary school curriculum. Brooklyn has more than

241,000 pupils registered in her public schools and 12,000 registered kindergarten pupils.

Brooklyn has no university, but it has many excellent private schools and academies, some of which, such as the Polytechnic Institute, Adelphi Academy, and St. John's College, hold collegiate rank and may grant degrees. The parochial schools also hold high rank, while the Pratt Institute affords thorough technical training to hundreds of pupils.

The Brooklyn Public Library, with which the excellent Brooklyn Library has recently been incorporated, maintains an extensive system of branch libraries throughout the borough; and when this is supplemented by the system of libraries recently presented by Mr. Andrew Carnegie, no community in the United States will be better equipped in this direction. These Carnegie branch libraries (20 in number) will be in charge of the public library and form part of its system.

One of the most notable of the educational institutions in Brooklyn is the Brooklyn Institute of Arts and Sciences. This valuable and practically unendowed institution is, as regards its present buildings, situated upon high ground adjacent to Prospect Park, on what is known as the East Side Park lands, of which 11½ acres have been leased to the trustees for 100 years. It is the development of a school of arts and sciences founded during the middle of the 19th century by Augustus Graham, a philanthropist of English extraction. It has expanded under the direction of Prof. Franklin W. Hooper and a public-spirited board of trustees into what is likely to prove the nucleus of a great national academy. It already has a well-furnished museum, which is especially rich in prehistoric American relics, and departments of archæology, architecture, astronomy, botany, chemistry, domestic science, electricity, engineering, entomology, geography, geology, law, mathematics, microscopy, mineralogy, music, painting, pedagogy, philology, philosophy, photography, physics, political science, and psychology, each of which is presided over by an expert in the science. Only the first section of the museum building has as yet been erected, but when completed the entire structure will cover a large area, with four interior courts to provide light for the central portions of the building. It will contain on the first floor rooms for collections illustrating the general history of the arts and architecture; on the second floor rooms for the illustration of the practical arts and sciences; and on the third floor galleries for the illustration of the history of painting, engraving, etching, and decorative art.

Brooklyn's public park system has been developed on a scale altogether commensurate with the character of the borough, and full advantage has been taken of the cheapness of land to make provision for the needs of the future in the matter of breathing places and pleasure grounds. The oldest and best known, although not the largest of these, is Prospect Park, which includes 516 acres of rolling land, with picturesque lakes and an unrivaled growth of old forest trees. Prospect Park is beautifully laid out, special care having been taken during the 40 years of its existence as a park to preserve its natural characteristics. Its statutory includes figures of J. S. T. Stranahan, one of the pioneers in the matter of providing public

BROOKS

parks; John Howard Payne, Thomas Moore, Washington Irving, Beethoven, and Mozart. There is also, at the foot of Lookout Hill, a memorial shaft in honor of the Maryland soldiers who fell in the battle of Long Island.

Another notable pleasure ground is Brooklyn Forest, which includes 536 acres on the crown of the ridge of hills on the Queens County border. Except for the laying out of walks and paths it has been left in its natural state. It affords splendid views of the Atlantic Ocean and Jamaica Bay, Sunset Park, a reserve of 14 acres on the shores of New York Bay, and the Coney Island Concourse, which runs along the Atlantic shore and contains 70 acres, are unique in their location. In addition there are nearly 40 small parks and recreation grounds in the borough. The system of parkways and boulevards under the care of the park department covers 42 miles of well-paved roadways, to which additions are constantly being made.

W. C. BRYANT,
Editor Brooklyn Times.

Brooks, Charles William Shirley, English journalist, editor of 'Punch': b. London, 29 April 1816; d. there, 23 Feb. 1874. He settled in London, wrote dramas, contributed to the leading periodicals and journals, and for five sessions wrote the 'Parliamentary Summary' for the *Morning Chronicle*. By its proprietors he was sent, in 1853, on a mission to report on the condition of labor and the poor in Russia, Syria, and Egypt, and a result of his observations appeared in 'The Russians of the South' (1856). He wrote political articles, attracted attention by several dramas and burlesques, and in 1854 joined the staff of the London 'Punch.' In 1870 he succeeded Mark Lemon as its editor. His novels, which include 'Aspen Court' (1855); 'The Gordian Knot' (1860); 'The Silver Cord' (1861); 'Sooner or Later,' with illustrations by Du Maurier (1866-8); 'The Naggeltons' (1875), show keen observation. He also wrote 'Amusing Poetry' (1857). His son, REGINALD SHIRLEY, collected Brooks' 'Wit and Humor from Punch' (1875).

Brooks, Elbridge Gerry, American Universalist clergyman: b. Dover, N. H., 29 July 1816; d. Philadelphia, Pa., 8 April 1878. His first pastorate was at West Amesbury, Mass., in 1837, and he was subsequently in charge of churches at East Cambridge, Mass., Lowell, Mass., Lynn, Mass., New York, and Philadelphia.

Brooks, Elbridge Streeter, American author, son of Elbridge Gerry Brooks (q.v.): b. Lowell, Mass., 14 April 1846; d. Somerville, Mass., 7 Jan. 1902. He was the author of more than 40 books for young people, intended to familiarize them with American history, among which are 'Historic Boys'; 'Chivalric Days'; 'The Story of the American Indian'; 'The Story of New York'; 'Heroic Happenings' (1893); 'The True Story of George Washington' (1895); 'The Century Book of Famous Americans' (1896); 'Stories of the Old Bay State' (1899); 'A Godson of Lafayette' (1900); 'Under the Allied Flags' (1901). He edited the 'Wide Awake Magazine' for several years, and was the literary adviser of the Boston publishing house of D. Lathrop Company from 1895 until his death.

Brooks, James Gordon, American poet: b. Claverack, N. Y., 3 Sept. 1801; d. Albany, 20 Feb. 1841. He studied law, and removed in 1823 to New York, where he became editor of the 'Minerva,' a literary journal, and afterward of the 'Literary Gazette,' the 'Athenæum,' and the *Morning Courier*, continuing in all these papers the publication of his verses. In 1828 he married Mary Elizabeth Aikin, who had written under the signature of Norma, and the next year appeared the 'Rivals of Este, and Other Poems,' by James G. and Mary E. Brooks.

Brooks, John, American soldier, and governor of Massachusetts: b. Medford, 1752; d. 1 March 1825. While pursuing the study of medicine he displayed a love for military exercises, and having settled as a medical practitioner at Reading undertook the drilling of a company of minute men, with whom, on the news of the expedition to Lexington, he marched in time to see the retreat of the British. Promoted soon after to the rank of major in the Continental service, he assisted in throwing up the fortifications on Breed's Hill, and was especially servicable to the army as a tactician. He was made lieutenant-colonel in 1777, and in the battle of Saratoga stormed the intrenchments of the German troops. He was a faithful adherent of the commander-in-chief during the conspiracy at Newburg. Washington requesting him to keep his officers within quarters, that they might not attend the insurgent meeting, his reply was: "Sir, I have anticipated your wishes, and my orders are given." Washington took him by the hand, and said: "Col. Brooks, this is just what I expected from you." After the peace he resumed the practice of the medical profession in Medford, and was for many years major-general of the militia of his county. In the War of 1812 he was adjutant-general of Massachusetts, and in 1816 was elected governor of that State, an office to which he was re-elected annually till 1823, when he declined being again a candidate.

Brooks, John Graham, American lecturer on economics: b. Acworth, N. H., 19 July 1846. He was graduated from the Harvard Divinity School in 1875, and subsequently studied in the universities of Berlin, Jena, and Freiburg. He was for a time in the work of the Unitarian ministry, and was for several years a lecturer in the extension department of the University of Chicago. For two years he served as an expert in the department of labor at Washington, making a report in 1893 upon workmen's insurance in Germany. He has published 'Charity and the Unemployed'; 'The Pope and the Encyclical on Labor'; 'The Social Unrest' (1903).

Brooks, Maria Gowan, (MARIA DEL OCCIDENTE), American poet: b. Medford, Mass., about 1795; d. Matanzas, Cuba, 11 Nov. 1845. She spent her youth in Charlestown, Mass., and the rest of her life in London, New York, and Cuba. Her chief poem is 'Zophiel, or the Bride of Seven,' the first canto of which appeared in Boston in 1825, and the rest was finished under Southey's supervision in 1833. 'Idomen, or the Vale of Yumuri,' is an autobiography (1843).

Brooks, Noah, American journalist and author: b. Castine, Maine, 30 Oct. 1830; d. Los Angeles, Cal., 16 Aug. 1903. From 1850 he was connected with newspapers in Massachusetts, California, Washington, and New York.

BROOKS

He published many popular books for boys, among which are 'The Fairport Nine' (1880); 'Our Baseball Club' (1884); 'How the Republic is Governed'; 'American Statesmen' (1893); 'Short Stories in American Party Politics' (1896); 'The Boys of Fairport'; 'The Mediterranean Trip.'

Brooks, Peter Chardon, American merchant: b. Medford, Mass., 6 Jan. 1767; d. Boston, 1 Jan. 1849. He began his business career as secretary in a marine insurance office in Boston, and presently became its principal. He rapidly acquired a fortune, retiring in 1803, and for the remainder of his life took an active interest in municipal and philanthropic affairs. He was the president of several benevolent associations, a member of the first city council of Boston, and sat in both houses of the State legislature. He was one of the most prominent opponents of the lottery schemes then countenanced by many respectable persons. One of his daughters married Rev. H. L. Frothingham (q.v.), and several prominent Boston families of to-day claim him as an ancestor. See Everett, 'Life of Peter C. Brooks.'

Brooks, Phillips, American Protestant Episcopal bishop: b. Boston, Mass., 13 Dec. 1835; d. there, 23 Jan. 1893. He inherited the best traditions of New England history, being on the paternal side the direct descendant of John Cotton, and his mother's name, Phillips, standing for high learning and distinction in the Congregational Church. Born at a time when the orthodox faith was fighting its bitterest battle with Unitarianism, his parents accepted the dogmas of the new theology, and had him baptized by a Unitarian clergyman. But while refusing certain dogmas of the orthodox Church they were the more thrown back for spiritual support upon the internal evidences of evangelical Christianity. Transition to the Episcopal Church was easy; the mother became an Episcopalian, and the future bishop received all his early training in that communion. But heredity had its influence, and in after life he declared that the Episcopal Church could reap the fruits of the long and bitter controversy which divided the New England Church only as it discerned the spiritual worth of Puritanism, and the value of its contributions to the history of religious thought and character. Such were the early surroundings of the man, and the subsequent influences of his life tended to foster this liberal spirit. When he entered Harvard, he came into an atmosphere of intense intellectual activity. James Walker was the president of the college, and Lowell, Holmes, Agassiz, and Longfellow were among the professors. He graduated with honor in 1855, and soon after entered the Episcopal Theological Seminary at Alexandria, Va. The transition from Harvard to this college was an abrupt one. The standards of the North and South were radically different. The theology of the Church in Virginia, while tolerant to that of other denominations, was uncompromisingly hostile to what it regarded as heterodox.

When the Civil War was declared he threw himself passionately into the cause of the Union. Yet his affection for his Southern classmates; men from whom he so widely differed, broadened that charity that was one of his finest characteristics, a charity that respected conviction wher-

ever found. No man, in truth, ever did so much to remove prejudice against a Church that had never been popular in New England. To the old Puritan dislike of Episcopacy and distrust of the English Church as that of the oppressors of the colony, was added a sense of resentment toward its sacerdotal claims and its assumption of ecclesiastical supremacy. But he nevertheless protested against the claim by his own communion to the title of 'The American Church,' he preached occasionally in other pulpits, he even had among his audiences clergymen of other denominations, and he was able to reconcile men of different creeds into concord on what is essential in all. The breadth and depth of his teaching attracted so large a following that he increased the strength of the Episcopal Church in America far more than he could have done by carrying on an active propaganda in its behalf. His first charge was the Church of the Advent, in Philadelphia; in two years he became rector of Holy Trinity Church in the same city. In 1869 he was called to Trinity Church, Boston, of which he was rector until his election as bishop of Massachusetts in 1891.

It is impossible to give an idea of Phillips Brooks without a word about his personality, which was almost contradictory. His commanding figure, his wit, the charm of his conversation, and a certain boyish gayety and naturalness, drew people to him as to a powerful magnet. He was one of the best-known men in America; people pointed him out to strangers in his own city as they pointed out the Common and the Bunker Hill monument. When he went to England, where he preached before the queen, men and women of all classes greeted him as a friend. They thronged the churches where he preached, not only to hear him but to see him. It was said of him that as soon as he entered a pulpit he was absolutely impersonal. There was no trace of individual experience or theological conflict by which he might be labeled. He was simply a messenger of the truth as he held it, a mouthpiece of the Gospel as he believed it had been delivered to him. Although in his seminary days his sermons were described as vague and unpractical, he was as great a preacher when under 30 years of age as at any later time. His early sermons, delivered to his first charge in Philadelphia, displayed the same individuality, the same force and completeness and clearness of construction, the same deep, strong undertone of religious thought, as his great discourses preached in Westminster Abbey six months before his death. His sentences are sonorous; his style was characterized by a noble simplicity, impressive, but without a touch showing that dramatic effect was strained for. He passionately loved nature in all her aspects, and traveled widely in search of the picturesque; but used his experience with reserve, and his illustrations are used to explain human life. His treatment of Bible narratives is not a translation into the modern manner, nor is it an adaptation, but a poetical rendering, in which the flavor of the original is not lost though the lesson is made contemporary. He used figures of speech and drew freely on history and art for illustrations, but not so much to elucidate his subject as to ornament it. As might be expected of one who, in the world's best sense, was so thoroughly a man, he had great influence with young men and was one of the

BROOKS—BROOM

most popular of Harvard preachers. It was his custom for 30 alternate years to go abroad in the summer, and there, as in America, he was regarded as a great pulpit orator. He took a large view of social questions, and was in sympathy with all great popular movements. His advancement to the episcopate was warmly welcomed by all parties, except one branch of his own church with which his principles were at variance, and every denomination delighted in his elevation as if he were the peculiar property of each. His works include 'Lectures on Preaching' (1877); 'Sermons' (1878-81); 'Bohlen Lectures' (1879); 'Baptism and Confirmation' (1880); 'Sermons Preached in English Churches' (1883); 'The Oldest Schools in America' (Bos. 1885); 'Twenty Sermons' (N. Y. 1886); 'Tolerance' (1887); 'The Light of the World, and Other Sermons' (1890); and 'Essays and Addresses' (1894). His 'Letters of Travel' show him to have been an accurate observer, with a large fund of spontaneous humor. See Allen, 'Life and Letters of Phillips Brooks'; Howe, 'Phillips Brooks' (1902).

Brooks, Preston Smith, American politician and legislator: b. Edgefield, S. C., 4 Aug. 1819; d. Washington, D. C., 27 Jan. 1857. He was graduated at South Carolina College in 1839; elected to the legislature of his native State in 1844; raised a company for the Mexican war and led it as captain in the famous Palmetto regiment. He was sent to Congress in 1853, made his first speech in February 1854, on the subject of the Nebraska bill; speaking also in June of the same year on the Pacific railroad bill. On 22 May 1856, Senator Sumner, of Massachusetts, having employed in a speech in the Senate various expressions which had greatly incensed the members of Congress from South Carolina, Brooks entered the Senate chamber, after the Senate had adjourned, while Sumner was seated at his desk engaged in writing, and with blows on the head from a gutta-percha cane struck the Senator to the floor, where he left him insensible. On 2 June a committee of the House of Representatives reported in favor of Mr. Brooks' expulsion. In the final action upon the report there were 121 votes in favor of and 95 opposed to it, which, being less than the requisite two thirds vote, prevented the House from agreeing to the resolution. Mr. Brooks, however, resigned his seat, and, 8 July, pleaded guilty before the court at Washington upon an indictment for assault, and was sentenced to a fine of \$300. Having addressed his constituents on the subject of the assault, he was re-elected to Congress by a unanimous vote, and made, on 7 Jan. 1857, a second speech on the Nebraska bill.

Brooks, Shirley. See **BROOKS, CHARLES WILLIAM SHIRLEY.**

Brooks, William Keith, American zoologist: b. Cleveland, Ohio, 25 March 1848; d. Baltimore, Md., 12 Nov. 1908. He was professor of zoology in Johns Hopkins University from 1876. He wrote 'Handbook of Invertebrate Zoology' (1882); 'Hereditry' (1884); 'The Development and Protection of the Oyster in Maryland' (1884); 'A Monograph of the Genus *Salpa*' (1893); 'Foundation of Zoology' (1898).

Brooks, William Robert, American astronomer: b. Maidstone, Kent, England, 11 June 1844. He was educated in the United States,

and in 1874 founded the Red House Observatory at Phelps, N. Y., where he discovered 11 comets. Since 1888 he has been in charge of the Smith Observatory at Geneva, N. Y., where he has discovered 12 more comets. In 1887 he was elected a Fellow of the Royal Astronomical Society of Great Britain.

Brooks of Sheffield, a fictitious personage alluded to in Dickens' 'David Copperfield.'

Brooks's, a noted London Club founded in 1764. It was originally a sporting establishment, managed by Almack, and its second proprietor was named Brooks, the club subsequently taking its name from him. It is situated at No. 60 Saint James Street, and is political in character.

Broom, various shrubs of the closely allied genera *Genista*, *Cytisus*, and *Spartium*, of the natural order *Leguminosae*, natives mostly of the warm and temperate parts of the Old World. The name is not applied to species which do not have the long, slender twigs, but is restricted to those characterized by these slender branches and numerous axillary flowers. *Genista monosperma* (*Spartium monosperma* of some botanists), a Spanish and north African species, attains a height of 10 feet; has almost leafless, grayish branches; small, simple, linear, silky leaves; fragrant white flowers in short lateral racemes; and one-seeded pods. It is planted in shrubberies and is grown in greenhouses in preferably loose, dry soil. *G. tinctoria*, dyer's greenweed, a native of Europe and western Asia, is an erect shrub about three feet tall with somewhat pubescent branches and many flowered axillary racemes which are terminally paniced. Its branches, leaves, and blossoms are used to dye wool yellow, or, when mixed with wood, green. *Cytisus scoparius*, Scotch or common broom, a native of middle and southern Europe, attains a height of 20 feet, but usually much less, has erect, slender branches, short petioled leaves, generally large, solitary, long-stalked, drooping yellow flowers and brownish black pods. It has been largely introduced into the United States for ornament, and is hardy almost as far north as Washington. It succeeds on dry soils, and produces an abundance of bloom in late spring and early summer. The stems and leaves, which are very bitter and nauseous tasting and smelling, have been used in dyeing and tanning, and the fibre of the former used to make cloth and paper. The wood of large specimens is highly valued for turning and cabinetmaking. *C. albus*, white or Portugal broom, a native of the Mediterranean region, which attains a height of three feet, sometimes even 20 feet, has fascicles of axillary flowers, for which it is frequently planted in shrubberies. Many other species are valued for ornamental planting, for pasturage, and since their flowers yield abundant nectar, for bee forage. *Spartium junceum*, Spanish broom, a native of southern Europe, is an upright shrub, 10 feet tall, with slender, green branches, fragrant yellow flowers which appear continuously during summer, and in California where the plant has been introduced, almost throughout the year. It grows on dry soils and in rocky places. Its fibre is used to some extent in Spain, Italy, and France for rope- and cloth-making, and even for making some kinds of lace. See **CYTISUS**; **GENISTA**; **SPARTIUM**.

BROOM-CORN—BROTHERS OF THE CHRISTIAN SCHOOLS

Broom-corn, (1) (*Sorghum vulgare*, millet or Guinea-corn), a plant of the order of grasses, with a jointed stem, rising to the height of 8 or 10 feet, extensively cultivated in North America, where the branched panicles are made into carpet-brooms and clothes-brushes. The seed is used for feeding poultry, cattle, etc. (2) *Sorghum saccharata*, from which a kind of syrup or molasses is made.

Broom Rape (*Orobanche ramosa*), an annual parasitic plant of the natural order *Orobanchaceæ*, a native of Europe but established in America, especially in tobacco and hemp fields, where it often does great damage by sucking the juices of the plants which it eventually kills. Its slender, brownish or straw-colored stems attain a height of 6 to 15 inches, bear small scales instead of leaves, and light blue sessile flowers, followed by an abundance of minute seeds which rapidly spread the pest. Clean seed, clean cultivation and change of crops upon the land for several years are the only safeguards and remedies.

Broom-sedge. See ANDROPOGON.

Brooms and Brushes, Manufacture of, in the United States. Europeans use to this day a broom made from hickory withes for rough sweeping, and the long-haired brush for housework, and it was not until about 1850 that Americans discovered the valuable properties of a variety of the indigenous Indian maize for broom making. The industry was for a time carried on in a desultory way, but the first factory established for the manufacture of brooms from corn was opened in 1859, by Ebenezer Howard, at Fort Hunter, Montgomery County, N. Y. Factories were also soon started in Fort Hunter by John D. Blood, who formed the firm of Blood & Herrick, and by Ebenezer Howard, who formed that of Howard & Bronson. All of the broom factories established at Fort Hunter have since become absorbed by the American Broom and Brush Company, and all are in operation to-day. The broom and whisk-broom industry is now carried on in the Eastern States almost entirely by the American Broom and Brush Company, which, besides the factories named, also have works at Buffalo, N. Y., Dallas, Pa., Baltimore, Md., and Richmond, Va. The business in the Western States is in the hands of the Cupples Woodenware Company, of Saint Louis, and Rosebroom & Company, of Chicago. In 1880 there were in the United States 980 establishments for the manufacture of brooms and brushes, with a capital of \$4,186,897, and a product valued at \$10,560,855. In 1905 there were reported 1,316 establishments, with a capital of \$12,052,236, and a product valued at \$21,103,776. Many brooms are made by hand in various penitentiaries throughout the country. There are also many brooms made in blind asylums, as the work is found especially adapted to blind men.

Broom Tops, the fresh and dried tops of *Cytisus scoparius* (common broom). There are two official preparations; the decoction (*decoctum scoparii*), consisting of a pint of distilled water to an ounce of the dried tops, and the juice (*succus scoparii*), made of three ounces of the fresh expressed juice to a pint of rectified spirits. They are valuable diuretics, especially

in cardiac dropsies. Scoparine and sparteia are the two active principles; the action of sparteia is analogous to that of conia.

Brose (Gaelic *brothas*), a dish sometimes used in Scotland, made by pouring boiling water, milk, or the liquor in which meat has been boiled, on oatmeal, and mixing the ingredients by immediate stirring. Butter may be added, and sweet milk when the brose is made with water. It is kail brose, water brose, or beef brose, according to the liquid used. Athole brose, a famous Highland cordial, is a compound of honey and whiskey.

Brother Jonathan, a name of personification applied to the people of the United States, as "John Bull" is to the people of England. The most widely accepted explanation of its origin rests on the tradition that Washington, on assuming command of the New England Revolutionary forces, being in great straits for arms and war material, and having a high regard for the judgment of his friend the governor of Connecticut, Jonathan Trumbull, said in that emergency, "We must consult Brother Jonathan." This expression, being repeated on other difficult occasions, came into common use, and at last was extended to the entire people of the country. See NATIONAL NICKNAMES.

Brotherhood of Andrew and Philip, a religious order founded in 1888, and which has spread among the churches of 19 denominations and is represented in a large proportion of the States. Its official organ is 'The Brotherhood Star.' The pledge of service is similar to that of the Brotherhood of Saint Andrew (q.v.). The name of the society contains an allusion to the fact that Andrew, the first of the 12 disciples to become a follower of Christ, immediately after entering upon his discipleship sought out his brother Philip and brought him to the Master.

Brotherhood of Saint Andrew, a religious organization of the Protestant Episcopal Church, founded in 1883 in St. James' Parish, Chicago. It has more than 1,200 active chapters, exclusive of the junior department. The society has extended to Canada, England, Scotland, Australia, the West Indies, and South America. The official organ of the brotherhood is 'St. Andrew's Cross,' published monthly. There are two rules, one of prayer and one of service. The pledge of service binds every member to make an earnest effort to bring at least one young man each week within the hearing of the gospel.

Brotherhood of Saint Paul, a fraternity of the Methodist Episcopal Church, founded in 1895, for the spiritual and social benefit of its members. Of the three orders into which it is divided—the Order of Jerusalem, the Order of Damascus, and the Order of Rome—the first is for new members and those who are not professing Christians; the second for members of the Methodist Episcopal Church, and the third for advanced Christians. The brotherhood has a ritual and a regalia.

Brothers of the Christian Schools, commonly called Christian Brothers. This is a Society of men belonging to the Roman Catholic Church who devote themselves exclusively to the education of youth. The Society was

BROTHERS OF THE SACRED HEART — BROUGH

founded in 1680 by Jean Baptiste de la Salle, Canon of the Metropolitan Church of Rheims, who, in the year 1900, was canonized by Pope Leo XIII.

The Society spread rapidly in France, partly because the Brothers made French the language of the schools instead of Latin, and partly because they did away with the individual system of teaching by grouping the pupils together into distinct classes. They abandoned the lecturing style in all their instructions for the Socratic method, introduced object-lessons and added museums to the equipment of the school.

These bold innovations in education met with popular favor and official recognition, and did more than anything else to bring about a general system of primary instruction in France. In consequence of these reforms in the traditional methods of teaching, the Christian Brothers have come to be considered the founders of primary education in Europe. In due time, the Society spread to Italy, Belgium, Germany, Austria, England, and Ireland; and also to Canada, the United States, South America, India, and South Africa.

The general methods of teaching followed by the Brothers, are explained in the 'Government of the Christian Schools,' while the qualities which they should possess as teachers are expounded in the 'Twelve Virtues of a Good Master.' Besides these two manuals, the Society has published for the benefit of its members numerous works on education and pedagogy together with a series of text-books on all subjects taught in the schools, including logic, ethics, literature, philosophy, methodology, mathematics, physics, etc.

The Christian Brothers established a College for the training of teachers in 1684, which was the first of its kind in Europe. They opened Sunday Schools in 1699, also the first of their kind, in which secular as well as religious instruction was given in the afternoon. They have novitiates in every "province" of the Society for the religious formation, and scholasticates for the pedagogical training of their members. They direct schools of all grades from the primary to the college; they have agricultural and technical schools as well as Normal Colleges, orphanages and "protectories." In the United States, they have 6 colleges and 90 other institutions taught by 980 Brothers. Altogether, the Society has more than 1,600 schools, with 15,500 Brothers and 350,000 pupils.

The Society was suppressed in 1792 at the beginning of the French Revolution, was restored in 1803 by order of Napoleon I., and incorporated with the University of France in 1808. It was again officially suppressed in France in 1904 during the war against religious Congregations waged by Premier Combes, but continued to live and flourish in other countries.

The Christian Brothers wear a distinctive religious habit and take the three vows of religion. As they do not take "orders," they are free to devote themselves entirely to the work of education.

BROTHER POTAMIAN,
Professor of Physics in Manhattan College.

Brothers of the Sacred Heart, a Roman Catholic congregation established in Lyons, France, in 1820 by Père André Coindre, of the Society of Missionaries. In 1847 five Brothers

came from France to this country to take charge of parish schools and asylums. They have establishments in the diocese of New Orleans, Natchez, Mobile, Natchitoches, Savannah, Trenton, Indianapolis, Manchester, Providence, Boston, Indian Territory, and over 30 places in Canada. In September 1900 at a general Chapter of the Congregation held in France, two provinces were formed, one for the United States and the other for Canada. The object of the Brothers is the Christian education of youth in schools, asylums and colleges. A novitiate for the province of the United States was opened in Metuchen, N. J., June 1901.

Brothers of Our Lady of Lourdes. This congregation was founded by Very Rev. S. M. Glorioux in 1830. Its object is the Christian education of youth, especially the poor, the care of orphan asylums, and the nursing of the sick and old people in hospitals. Pope Leo XIII. approved the congregation and its rule 18 July 1892. The Brothers conduct a House of Studies and a boarding and day school at South Park, Wash., and a protectory for Homeless Boys at Pittsburg and New Derry, Pa.

Brothers of Charity, a congregation founded for the purpose of securing the sanctification of its members by the practice of the three simple vows and the observance of its constitution. Its special object is the ministry of charity in maintaining and ministering to the aged, the sick and the insane, in sheltering the poor, in educating poor children and performing any other work of charity to which they may be called. The congregation was founded in Belgium about 1809 by Rev. I. Triest, Canon of Saint Bavon, Ghent.

Brothers of the Christian Instruction, a Roman Catholic Institute founded at Saint Brieux, France, by the Abbé Joan Mary De la Mennais, and approved by the Holy See in 1801. The Order was established in Canada in 1886 and has 12 establishments in the archdiocese of Montreal; one in the archdiocese of Ottawa, one in the diocese of Saint Hyacinth, two in the diocese of Three Rivers, and one in the diocese of Valleyfield. The object of the Order is the Christian education and instruction of youth. General motherhouse at Ploermel, France; Provincial House and Novitiate at La Prairie, near Montreal.

Brotherhoods, Religious. See ORDERS, RELIGIOUS.

Brothers and Clerks of the Common Life, an institute founded by Gerhard Groot, a deacon of Deventer in 1384 for the purpose of providing a home for men who desired to live an austere Christian life without taking perpetual vows. See COMMON LIFE, BROTHERS OF THE.

Brotherton, Alice (WILLIAMS), American author and lecturer: b. Cambridge, Ind. She married William Ernst Brotherton, 18 Oct. 1876. She has lectured on Shakespeare and other subjects in English literature, contributed to magazines, and published the volumes: 'Beyond the Veil' (1886); 'The Sailing of King Olaf' (1887); and 'What the Wind Told the Tree-tops' (1888).

Brough, John, American statesman: b. Marietta, Ohio, 17 Sept. 1811; d. Cleveland 29

BROUGHAM .

Aug. 1865. In his youth he was a printer's apprentice. He studied at the Ohio University and later entered journalism. As a Democratic orator he became well-known. In 1846 he entered the legal profession. In 1863 the Republican Union party nominated him for governor and he was elected by a joint vote of all electors advocating war. He has been called the "war governor" of his State.

Brougham, Henry (BARON BROUGHAM AND VAUX), British statesman and jurist: b. Edinburgh, 19 Sept. 1778; d. Cannes, 7 May 1868. His father, Henry Brougham, belonged to an old Westmoreland family, and his mother, Eleonora Syme, was a niece of Robertson the historian. He was educated at the High School and the University of Edinburgh, entering the latter at the age of 16. At the age of 18 he wrote an essay, 'Observations on the Phenomena of Light,' which, being sent to the Royal Society, was printed in its 'Transactions' for 1796. He also contributed a paper to each of the next two volumes of the Royal Society's 'Transactions.' On leaving college he devoted himself to the study of law at Edinburgh, and was admitted a member of the Society of Advocates in 1800. As a member of the Speculative Club he was brought into contact with Jeffrey, Horner, and others afterward famous; and along with the above-mentioned writers and Sydney Smith bore a chief part in the starting of the 'Edinburgh Review' in 1802, to which he contributed a great number of articles. In 1803 appeared his 'Inquiry into the Colonial Policy of the European Powers,' a work which showed a wide extent of knowledge in the author, and drew upon him considerable attention. In it he expressed his decided hostility to the slave-trade. Finding too circumscribed a field for his abilities in Edinburgh, he removed to London, and in 1808 was called to the English bar. One of the first occasions on which he distinguished himself in his professional capacity was in 1810, when he spoke before the House of Lords in behalf of some Liverpool merchants who wished the repeal of the orders in council prohibiting trade with the states subject to France. The same year he entered Parliament as member for the rotten borough of Camelford, joined the Whig party, which was in opposition, and soon after obtained the passing of a measure making the slave-trade felony. He also succeeded, before the dissolution of Parliament, in getting the orders in council repealed. At the general election in 1812 he endeavored to get himself elected as one of the members for Liverpool, but was defeated by Canning, and remained without a seat till 1816, when he was returned for Winchelsea. He represented this borough up to 1830. On his return to Parliament he began his life-long efforts in the cause of education by obtaining the appointment of a committee to inquire into the state of education among the poor of the metropolis. In 1819 he and his friends established a model school for the children of the poorer classes in London. In 1823 he was instrumental in founding the first mechanics' institute. In 1825 he published his 'Practical Observations upon the Education of the People,' which ran through 20 editions. The same year he was elected lord rector of Glasgow University; and also introduced a bill into Parliament for the incorporation of the

London University, of which he may be considered one of the chief founders. He also bore an active part in establishing the Society for the Diffusion of Useful Knowledge in 1827, the first publication of which was his 'Discourse on the Objects, Pleasures, and Advantages of Science.' Meantime his reputation as a brilliant speaker and able advocate had been gradually increasing, and his fearless and successful defense of Queen Caroline in 1820-1 placed him on the pinnacle of popular favor. Two of the speeches spoken by him in this course are looked upon as classic specimens of English eloquence. But the part he took in the defense of the queen brought him into disfavor with the king, and delayed his promotion for some years, so that it was not till 1827 that he was made a king's counsel. In Parliament he continued to speak against negro slavery, and in favor of what may be considered the most valuable of the reforms that we owe to him; namely, the amendment of the common law and of the judicial administration. On this subject he delivered a famous speech of six hours' duration, on 7 Feb. 1828. At the general election of 1830 he was returned for the large and important county of York, an honor which he attributed chiefly to a celebrated speech delivered by him shortly before on the slave-trade. In the ministry of Earl Grey he accepted the post of lord chancellor, and 22 Nov. 1830, was raised to the peerage, with the title of Baron Brougham and Vaux. The Reform Bill of 1832 received his warmest support in the House of Lords. In 1834, when the Whig ministry were dismissed, Lord Brougham of course lost the chancellorship, and this proved the end of his official life, as he was never afterward a member of any ministry. Henceforth he devoted himself chiefly to legal and social reforms, maintaining his hostile attitude toward slavery, and continuing his labors in the cause of popular education. He was a zealous opponent of the corn laws. In connection with the acts of his later years, we may mention his presidency of the Law Amendment Society, and of the Social Science Association. He latterly resided much at Cannes, in the south of France. He married, in 1819, Mary Anne Eden, and had two daughters, one of whom died in infancy in 1820, the other in 1839, at the age of 17. Lord Brougham accomplished a large amount of literary work, contributing to newspapers, reviews, and encyclopedias, besides writing several independent works; and he had no mean reputation in mathematics and physical science. His works, collected by himself, and published in 10 volumes (Edin. 1855-7), include: 'Lives of Men of Science, Time of George III.'; 'Lives of Men of Letters, Time of George III.'; 'Eminent Statesmen'; 'Natural Theology'; 'Rhetorical and Literary Dissertations and Addresses,' 'Rhetorical and Political Dissertations'; and 'Speeches on Social and Political Subjects.' He also, along with Sir Charles Bell, brought out an edition of Paley's 'Natural Theology'; translated the oration of Demosthenes 'On the Crown'; and in 1855, conjointly with Mr. E. J. Routh, published an 'Analytical View of Sir Isaac Newton's Principia.' He was president of University College, London, chancellor of Edinburgh University, D.C.L. of Oxford, and a member of the Institute of France. Lord Brougham must be looked upon as one of the most remarkable

men of his century. His energy and industry were enormous, his versatility surprising. He was a mathematician, a historian, a biographer, an essayist, a moral and political philosopher, a lawyer, an orator, and a statesman. As an orator and parliamentary debater he was inferior to Canning alone.

Brougham, John, Irish actor and playwright: b. Dublin, 9 May 1810; d. New York, 7 June 1880. He was at first a student of surgery, but when thrown on his own resources he adopted the stage as a profession. After a short experience as actor, playwright, and manager, he came to America in 1842. Eighteen years later he returned to England, but in 1865 he again came to the United States, and remained here till his death. He wrote about 100 plays, including 'The Game of Love'; 'Romance and Reality'; 'Love's Livery'; 'The Duke's Motto,' etc., and contributed largely to periodicals.

Brougham, a close four-wheeled carriage with a single inside seat for two persons, or a four-wheeled close carriage with two seats, accommodating four persons. Each type is glazed in front and has a raised seat for the driver. Named after Lord Brougham.

Broughton, Hugh, English Biblical scholar: b. Owlbury, Shropshire, 1549; d. London, 4 Aug. 1612. He was educated at Cambridge, and early became distinguished for his familiarity with the learned tongues. He entered the Church, but his views coming under ecclesiastical disapproval, he went to the Continent for a time. For several years he preached to an English congregation in one of the cities of Holland. He wrote: 'A Concert of Scripture'; and an 'Explication of the Article of Christ's Descent into Hell.' Ben Jonson in two of his plays holds up to ridicule this Puritan preacher.

Broughton, brow'ton, Lord (JOHN CAM HOBBHOUSE), Baron, English statesman and writer: b. Bristol, 27 June 1786; d. London, 3 June 1869. He was educated at Westminster School and Trinity College, Cambridge, where he graduated B.A. in 1808, and M.A. in 1811. He was an intimate friend of Lord Byron, and accompanied him in his travels to Greece and Turkey in 1809. In 1812 appeared his 'Journey Through Albania and Other Provinces of Turkey.' In the years 1813 and 1814 he accompanied the allied armies in Germany, and was present at the battle of Dresden. He also accompanied Byron to Italy in 1816-17, and visited Rome and Venice with him. He suggested an extension of the fourth canto of 'Childe Harold,' which Byron dedicated to him, and by arrangement with the poet he undertook to write for it a series of notes, for which his observations during their journey furnished materials. These notes were written at Venice, and ultimately formed a separate work, 'Historical Illustrations of the Fourth Canto of Childe Harold,' published by Murray in 1818. Hobbhouse was an advanced liberal in politics, and on his return took an active part in the advocacy of reforms. In 1816 he published anonymously the 'Hundred Days in Paris,' which from its hostility to the Bourbon cause, gave great offense to the governments of France and England, and a French translator and the publisher of it were fined

and imprisoned for writing an anonymous pamphlet, the 'Trifling Mistake.' Broughton was committed to Newgate, and there lay for almost three months. That year he was returned for Westminster, and became a supporter of liberal measures, as the Reform Bill of 1832, the repeal of the Test and Corporation acts, the removal of Catholic disabilities, etc. In February 1832, he entered Lord Melbourne's ministry as secretary of war, and became a privy counselor. In 1833 he was made chief secretary for Ireland, but lost his seat in seeking re-election. In 1834, he was made chief commissioner for woods and forests, and the following year became president of the board of control. He lost his seat for Nottingham in 1847, but a seat was found for him at Harwich, which he continued to occupy till he was raised to the peerage in 1851. He had succeeded his father as baronet in 1831. As he left no male issue, the title became extinct, the baronetcy passing to his nephew.

Broughton, Rhoda, English novelist: b. North Wales, 29 Nov. 1840. Much of her life has been passed at Oxford. Her novels, especially the earlier ones, show great cleverness, and are very popular. They include 'Cometh Up as a Flower' (1867); 'Not Wisely but Too Well' (1867); 'Red as a Rose Is She' (1870); 'Goodbye, Sweetheart, Goodbye' (1872); 'Nancy' (1873); 'Belinda' (1883); 'Doctor Cupid' (1886); 'Alas!' (1890); 'A Beginner' (1894); 'Scylla or Charybdis?' (1895).

Brouncker, or Brounker, William, British mathematician: b. 1620; d. 1684. He became Viscount Brouncker of Castle-Lyons, in Ireland, inheriting the title from his father. He was strongly attached to the royal cause, and in 1660 was one of the first to sign the declaration which hailed Monk as the restorer of the laws and privileges of the nation. At the Restoration he was appointed to several lucrative offices, and on the formation and incorporation of the Royal Society became its first president. This honorable office he continued to hold for 15 years. His mathematical attainments must have been of a high order, as he is admitted to have been the discoverer of continued fractions, and of an important theorem relating to the quadrature of the equilateral hyperbola. He also published experiments on the recoiling of guns, and a translation of Descartes' 'Musicae Compendium,' with notes.

Broussa, brô'sa. See BRUSSA.

Broussais, François Joseph Victor, French physician: b. Saint Malo, 17 Dec. 1772; d. 17 Nov. 1838. Educated at the college of Dinan, he entered the army and soon attained the rank of sergeant; but a severe illness caused him to give up a military career and devote himself to medicine. He studied at Brest and Paris, and in 1820 obtained a professorship at Val-de-Grâce, a chair which he exchanged in 1831 for that of general pathology in the faculty of medicine at Paris. His first important work was his 'Recherches sur la Fièvre Hectique' (1803), which was followed by the more celebrated 'Histoire des Phlegmasies ou Inflammations Chroniques' (1808), and 'Examen de la Doctrine Médicale Généralement Adoptée' (1816). In these works he propounded what is known as the physiological system of medicine. According to him irritation or excitation is the funda-

mental property of all living animal tissues, and diseases are produced by an undue increase or diminution of that property. Broussais also taught and wrote on phrenology.

Brousson, Claude, French martyr: b. Nîmes, 1647; d. Montpellier, 4 Nov. 1698. He was educated for the law, and practised as an advocate first at Castres and Castelnaudary, and afterward in the Parliament of Toulouse, where the Protestants, to whom he belonged, were often indebted to him for the zeal and ability with which he defended their cause. In 1683, when the government had resolved on recalling the edict of Nantes, and trying the effect of persecution as a means of suppressing the Reformation, it was at Brousson's house the deputies from all the churches assembled, and resolved that, even were their churches destroyed they would still hold their meetings, though it should be under the canopy of heaven. His part in this and other important movements marked him out as one of the first objects of attack; and on receiving warning of an intention to arrest him, he sought an asylum at Lausanne, where he published several works, exposing the persecutions to which the Protestants of France were subjected, and awakening the sympathy of their brethren in all other parts of Europe. Nor was he satisfied merely to aid the cause with his pen. At the hazard of his life he returned to France, and continued for four years among the recesses of the Cévennes, preaching the gospel. In 1693 he repaired to Holland, where a pension was given him by the States-General; but the sufferings of his persecuted countrymen were ever uppermost in his mind, and he visited many courts of Europe to plead their cause, and more than once went to France for their instruction and encouragement. He was on a mission to France when, a price having been set on his head, he was arrested at Oleron, tried at Montpellier, condemned to be broken on the wheel, and executed accordingly.

Broussonet, Pierre Marie Auguste, French naturalist: b. Montpellier, 28 Feb. 1761; d. there, 27 July 1807. In Paris he studied natural history; went to England and pursued ichthyology, and after three years' residence there returned and was assistant in the College of France. At this period he communicated a number of valuable papers to the Academy of Sciences, of which he became a member. In 1785 he was appointed secretary to the Paris Agricultural Society. Merino sheep and the Angora goat are said to have been first introduced by him into France. The Revolution breaking out, he became connected with the Girondists. On the downfall of that party he was arrested at Montpellier, but having escaped, crossed the Pyrennes under the pretext of botanizing, and arrived in Spain destitute. Later he went to Africa and resumed his botanical studies, making some important collections. Returning to France, after executing various missions he was appointed, in 1805, to the chair of botany at Montpellier. In the same year he became a member of the Corps Législatif. He died from the effects of a fall by which the brain had been seriously injured. Besides his 'Ichthyologia Decas Prima' (1872), his publications include important memoirs of ichthyology and botany.

Broussonetia, a genus of trees. See MUL-BERRY.

Brouwer, or Brauwer, Adrian. See BRAUWER, ADRIAN.

Brower, Daniel Roberts, American physician: b. Philadelphia, Pa., 1839; d. Chicago, Ill., 1 March 1909. In 1864 he was appointed assistant surgeon of the United States volunteers and afterwards medical superintendent of the Eastern Lunatic Hospital of Virginia, 1868-75, and professor of nervous diseases in the Rush Medical College of Chicago, and in the Woman's Medical College of the Northwest University at Evanston, Ill.

Brower, Jacob Vradenburg, American explorer and archæologist: b. York, Mich., 21 Jan. 1844; d. 1905. He served in the cavalry and the navy during the Civil War, was a member of the Minnesota legislature, 1867-73, and discovered numerous prehistoric mounds at Mille Lac and other points in Minnesota. He published 'The Mississippi River and Its Source' (1893); 'Prehistoric Man at the Head Waters of the Mississippi' (1895); 'The Missouri River and Its Utmost Source' (1896); 'Quivira' (1898); 'Harahey' (1899); 'Mille Lac' (1899).

Brown, Aaron Venable, American politician: b. Brunswick County, Va., 15 Aug. 1795; d. 1859. He studied law, and commenced practice in Nashville, Tenn. He was partner in business with President Polk, until the latter entered upon his congressional career; served in almost all the sessions of the legislature of Tennessee between 1821 and 1832; was a member of the House of Representatives in Congress from 1839 to 1845; and was in that year elected governor of Tennessee. He was a delegate to the southern convention held at Nashville in 1850, and submitted a report to that body known as the Tennessee platform. He was also a member of the convention of the democratic party at Baltimore in 1852, to which he reported the platform adopted by them. In 1857 he became a member of President Buchanan's cabinet, in which he held the office of postmaster-general.

Brown, Abbie Farwell, American writer for young people: b. Boston, about 1875. She has published 'The Book of Saints and Friendly Beasts' (1900); 'In Days of Giants' (1902); 'The Lonesomest Doll'; 'Star Jewels' (1905).

Brown, Abram English, American historical writer: b. Bedford, Mass., 21 Jan. 1849; d. there 20 Feb. 1909. He was the author of 'Beneath Old Roof Trees' (1896); 'Beside Old Hearthstones' (1897); 'History of Bedford' (1892); 'Glimpses of New England' (1894); 'Flag of the Minute Men' (1894); 'Faneuil Hall and Market'; 'John Hancock.'

Brown, Alexander, American historian: b. Glenmore, Nelson County, Va., 5 Sept. 1843; d. 29 Aug. 1906. He served in the Confederate army during the Civil War and from 1880 devoted himself to literature. He wrote 'New Views of Early Virginia History' (1886); 'The Genesis of the United States' (1890); 'The Cabells and Their Kin' (1895); 'The First Republic in America' (1898); 'The History of Our Earliest History' (1898); 'English Politics in Early Virginia' (1901).

Brown, Alice, American novelist and writer of short stories descriptive of phases of New England life: b. Hampton Falls, N. H., 5

Dec. 1857. She taught school for several years, but has given herself entirely to literary pursuits for some years. Her work is most careful and conscientious in character, displaying equal literary skill and sympathetic insight into character. She has published: 'Fools of Nature'; 'Meadow Grass' (1895); 'By Oak and Thorn,' a volume of English travels (1896); 'The Road to Castaly,' a work of verse (1896); 'The Day of His Youth' (1896); 'Tiverton Tales' (1899); 'King's End'; 'Margaret Warren'; 'Mercy Otis Warren,' a biography; 'The Mannerings'; 'High Noon.'

Brown, Benjamin Gratz, American politician: b. Lexington, Ky., 28 May 1826; d. St. Louis 13 Dec. 1885. He practiced law in Missouri, and was a member of the State legislature in 1852-8. In the Civil War he served in the Union army, recruiting a regiment, and becoming a brigadier-general of volunteers. In 1863-7 he was United States Senator from Missouri, and in 1871 was elected governor of his State. He was the candidate for the vice-presidency of the United States on the ticket with Horace Greeley in 1872.

Brown, Caroline Virginia (KROUT), American novelist: b. Crawfordville, Ind. She has published 'Knights in Fustian' (1900); 'Bold Robin and His Forest Rangers' (1905); 'On the We-A Trail' (1905).

Brown, Charles Brockden, American novelist: b. Philadelphia 17 Jan. 1771; d. 22 Feb. 1810. He descended from a family of Quakers, was remarkable in his childhood for his attachment to books, and at the age of 16, after having received a liberal education, had already formed plans of extensive literary works. The delicacy of his constitution incapacitated him for the bustle of business and all athletic amusements. During frequent visits to New York he became intimate with a literary club, who fostered his devotion to letters, and increased his eagerness to be conspicuous as a writer. He kept minute journals, indited essays and dissertations, and cultivated, with unremitting assiduity, the arts of composition. The first novel which he wrote was entitled 'Sky Walk,' subsequently incorporated in 'Edgar Huntley.' 'Wieland,' his first published novel, appeared in 1798. It soon acquired the reputation of a powerful and original romance. The next was 'Ormond, or the Secret Witness' (1799), which had neither the success nor the merit of the other, but still exhibits uncommon powers of invention and description. At this time Brown had begun no less than five novels, two of which—'Arthur Mervyn' and 'Edgar Huntley,'—were completed and sent forth almost immediately. In the former the ravages of the yellow fever, which the author had witnessed in New York and Philadelphia, are painted with terrific realism. All these works abound in both excellencies and faults, and are strikingly original. In 1801 he published another novel,—'Clara Howard,'—less open to exception, but also less deserving of praise. Its form is different from that of the others, being epistolary. The last of his novels was 'Jane Talbot' (1804). It is deficient in interest, and indeed in all respects inferior to its predecessors. In April 1799, Brown published the first number of the 'Monthly Magazine and American Review.' This work he continued until the end of the

year 1800, writing abundantly for it. Circumstances compelled him to relinquish it; but in 1805 he commenced another journal, with the title of the 'Literary Magazine and American Register,' and in this undertaking persevered for five years. In 1806 he entered upon a new work, a semi-annual 'American Register,' five volumes of which he lived to complete and publish. It is now and must long be consulted as a valuable body of annals. In 1809 it was discovered that his lungs were seriously affected, and he then consented to travel for the recovery of his health. The remedy, however, was applied too late. In November of that year he betook himself to his chamber, as he thought, for a few days; but his confinement lasted until February, and ended only with his life. His writings are characterized by rich diction, variety of incident, and vivid representation, but he deals too much in the extravagant and the horrible.

Brown, Elmer Ellsworth, American educator: b. Kiantone, Chautauqua County, N. Y., 28 Aug. 1861. He graduated at the Illinois State Normal University, 1881, and at the University of Michigan, A.B. 1889, and made use of the intervening time in earning the means for his university course by teaching public schools in Belvidere, Ill. He was elected association state secretary for Illinois of the Y. M. C. A., and served in that capacity, 1884-87; was principal of the high school, Jackson, Mich., 1890-91; acting assistant professor of science and art of teaching at Ann Arbor, 1891-92; associate professor of a similar chair in the University of California, 1892-93; full professor, 1893-1906, and honorary professor from 1 July 1906, when he was appointed United States Commissioner of Education to succeed William T. Harris, deceased, and thus became head of the Bureau of Education in the Department of the Interior, Washington, D. C. He visited Europe (1889) to pursue a post-graduate course in pedagogy at the University of Halle, Wittenburg, Germany, receiving the degree of Ph.D. in 1890. His honorary degrees are Columbia, LL.D. (1907) and Wesleyan, LL.D. (1909). He was elected member of the National Council of Education and served as president, 1905-07. He was also made fellow of the American Academy of Arts and Science and vice-president of the section of education in 1907. Among his contributions to pedagogic literature are 'The Making of our Middle Schools' (1903); 'Origin of American State Universities' (1905); 'Government by Influence and other Addresses' (1909). He has also published in pamphlet form many articles written for magazines.

Brown, Ford Madox, English painter, grandson of Dr. John Brown of Edinburgh, the author of the Brunonian system of medicine: b. Calais, France, 16 April 1821; d. London 6 Oct. 1893. He studied at Bruges, Ghent, and Antwerp, and after a three years' residence in Paris he went to England about 1845. In 1844 and 1845 he contributed (unsuccessfully) cartoons of the 'Finding of the Body of Harold,' 'Justice,' and other subjects to the competitive exhibition for the frescoes of the Houses of Parliament. In 1865 he opened in London an exhibition of many of his pictures, including 'The Last of England' (1852); 'The Autumn Afternoon'; and 'Work' (1865); the last named having occupied him for several years. Only

BROWN

a month before his death he completed the last of the 12 Manchester town-hall frescoes, on which he had been engaged for a long time. Among his other works are 'Lear and Cordelia' (1849); 'Pretty Baa-Lambs' (1851); 'Chaucer at the Court of Edward III.' (1851); and 'Cordelia's Portion.' He is generally rated as a pre-Raphaelite, but though a close intimacy existed between him and the brotherhood, he never actually joined them. See Hueffer, 'Ford Madox Brown: a Record of His Life and Work' (1896).

Brown, Francis, American scholar: b. Hanover, N. H., 26 Dec. 1849. He was graduated from Dartmouth College in 1870, and the Union Theological Seminary, New York, in 1877. He was instructor in biblical philology in the latter institution 1879-81; associate professor 1881-90; professor of Hebrew from 1890; and on 12 May 1908 was elected president. He is the author of 'Assyriology: Its Use and Abuse in Old Testament Study' (1885); 'The Teaching of the Twelve Apostles' with Hitchcock; 'Hebrew and an English Lexicon of the Old Testament' with Driver and Briggs (1891-1906).

Brown, Sir George, English military officer: b. near Elgin, Scotland, 1790; d. 1865. He served in the Peninsular war, and in the American campaign of 1814, being wounded at the battle of Bladensburg. He became lieutenant-general in 1851; and distinguished himself in the Crimean war at Alma, Inkermann, and Sebastopol. He was made K. C. B. in 1855.

Brown, George, Canadian statesman: b. Edinburgh, Scotland, 19 Nov. 1818; d. 9 May 1880; educated at the high school there. He emigrated to the United States with his father, and assisted in the management of a newspaper at New York; but in 1843 removed to Toronto, Canada, where he founded a newspaper, *The Globe*, which was very successful. In 1852 he was returned to Parliament, and rapidly rose to the first rank as a debater and advocate of reforms. In 1858 he was called to the office of premier, and formed an administration which, however, owing to an adverse vote of the Assembly, lasted only three days. In 1864 he joined the coalition government as leader of the reform section, and took an active part in the conferences held at Charlottetown and Quebec on the subject of the federation of the North American colonies; but resigned his office as minister in December 1865. He was called to the Senate in 1873, and the year after went to Washington along with Sir Edward Thornton to negotiate a commercial treaty with the United States. He died of a gunshot wound inflicted by a discharged employee. See Mackenzie, 'Life and Speeches of the Hon. George Brown' (1882).

Brown, George, American rear-admiral: b. Indiana, 19 June 1835. He entered the navy in 1849 and served with distinction in the Federal navy during the Civil War. He was in command of the Norfolk navy yard, 1866-97, being appointed a rear-admiral in 1893.

Brown, George Douglas, Scottish novelist: b. Ochiltree, Ayrshire, Scotland, 1869; d. London, 28 Aug. 1902. He was educated at the universities of Glasgow and Oxford and was successively reporter for a London journal and

literary adviser to a publishing house. His novel of Scottish life, 'The House with the Green Shutters,' published in 1902, attracted great attention in England and the United States. See 'Life' (1903).

Brown, George Loring, American landscape artist: b. Boston, 2 Feb. 1814; d. 25 June 1889. He went abroad at 16 and on his return, two years later, was a pupil of Washington Allston. In 1840 he went to Paris to study under Isabey. Among noted pictures by him are 'Doge's Palace and Grand Canal'; 'Bay of Naples'; 'Moonlight Scene'; 'The Crown of New England'; and 'The Bay of New York,' the two latter acquired by Edward VII. when visiting the United States as Prince of Wales.

Brown, George William, American jurist: b. Baltimore, Md., 1812; d. 1890. After studying law he was admitted to the bar and in 1860 was elected mayor of his native city. At the time of the passage of troops through Baltimore, 19 April 1861, he placed himself at the head of the 6th Massachusetts regiment then on its way to Washington, and did everything in his power to suppress the riot which the appearance of the soldiers had occasioned. He was chief justice of the Maryland supreme court, 1873-88, and with two others compiled the first 'Digest of the Decisions of the Maryland Court of Appeals' (1847).

Brown, Glenn, American architect: b. Fauquier County, Va., 13 Sept. 1854. He has practised his profession in Washington, D. C., since 1878. He is the author of 'Water Closets: a Historical, Mechanical and Sanitary Treatise' (1884); 'Healthy Foundations for Houses' (1885); 'Trap Syphonage' (1886); 'History of the United States Capitol' (1900).

Brown, Gould, American grammarian: b. Providence, R. I., 7 March 1791; d. Lynn, Mass., 31 March 1857. He is known as the author of 'Brown's Grammar,' a school text-book widely used for some generations, and still in circulation. He published 'First Lines of English Grammar' (1823); 'Grammar of English Grammars' (1850-1); etc. He taught an academy in New York for 20 years.

Brown, Harvey, American army officer: b. Rahway, N. J., 1795; d. Clifton, Staten Island, 31 March 1874. He graduated at West Point in 1818 and was in constant service for more than 45 years. In the Black Hawk expedition, the Seminole Indian campaigns, in the Army of Occupation in Mexico, and to the time of the Civil War, he did gallant duty, for which he received several brevets. In 1862 he was brevetted a brigadier-general in the regular army and promoted colonel, and in 1863 was promoted to major-general, and retired.

Brown, Helen Dawes, American novelist and lecturer upon English literature: b. Concord, Mass., 1857. She has published 'Two College Girls' (1886); 'The Petrie Estate' (1893); 'Little Miss Phoebe Gay' (1895); 'Phoebe Gay in Her Sixteenth Year'; 'A Civilian Attache.'

Brown, Henry Billings, American jurist: b. Lee, Mass., 2 March 1836. After studying law in the Yale and Harvard law schools he went to Detroit and was there admitted to the bar in 1860. In 1875 he was appointed United States district judge for eastern Michigan,

BROWN

retaining this post till 1890, when he became an associate justice of the supreme court of the United States. He retired in 1906. He has compiled a volume of admiralty reports.

Brown, Henry Kirke, American sculptor: b. Leyden, Mass., 24 Feb. 1814; d. Newburg, N. Y., 10 July 1886. He made the equestrian statue of Washington in Union Square, New York, the altar piece for the Church of the Annunciation in the same city, portrait busts of William Cullen Bryant, Dr. Willard Parker, Erastus Corning and other New York men, and the statue of De Witt Clinton in Greenwood cemetery. The last named was the first bronze statue cast in the United States. Mr. Brown brought skilled workmen from Europe and did the first work in bronze casting attempted in this country. Some of his other well-known works are a statue of Lincoln in Prospect Park, Brooklyn, and equestrian statues of Gen. Scott and Nathanael Greene for the national government.

Brown, J. Appleton, American artist: b. Newburyport, Mass., 24 July 1844; d. 1902. He studied art in Boston and Paris, and after having a studio in Boston for some years removed to New York in 1890 and became a member of the Society of American Artists. Noted works by him are 'Old Road near Paris'; 'On the Merrimac at Newburyport'; 'The Grain Field' (1902).

Brown, Jacob, American general: b. Bucks County, Pa., 9 May 1775; d. Washington, 24 Feb. 1828. He was descended from members of the Society of Friends; supported himself in early life by teaching school; was also employed for some time as a surveyor of public lands in Ohio; and settling in Jefferson County, N. Y., in 1799, became one of the pioneers in that part of the country. He next joined the militia service as a militia general in 1812; was soon after appointed brigadier-general in the regular army, and in 1814, major-general; assisted in the defense of Sackett's Harbor in 1813; exhibited much bravery in the battle of Chippewa, in that of Niagara Falls, and at the siege of Fort Erie; received the thanks of Congress and a gold medal, "emblematical of his triumphs"; and finally, at the termination of the war, continued in the army as major-general, and in 1821 succeeded to the supreme command.

Brown, James, American book-publisher: b. Acton, Mass., 19 May 1800; d. 10 March 1855. He began life as a servant in the family of Prof. Hedge, of Cambridge, who gave him instructions in the classics and in mathematics. He next entered, as shop boy, the service of William Hilliard, and in due time was taken into the Boston publishing firm of Hilliard, Gray & Company. Upon its dissolution, by the death of some of the partners, he became one of the firm now known as Little, Brown & Company, and remained in this connection until his death. The special province of the firm was the publication of law books and importation of foreign editions in the general trade, in which departments his scholarly accomplishments and taste were conspicuous and of good service in improving the style of book-making in America.

Brown, John, Scotch covenanting martyr: b. about 1627. He is said to have fought against the government at Bothwell Bridge in 1679, and to have been on intimate terms with the leaders

of the persecuted party. He was shot by Claverhouse and a party of his dragoons at Priestfield, or Priesthill, in the upland parish of Buirkirk, Ayrshire, where he cultivated a small piece of ground and acted as a carrier, in 1685.

Brown, John, Scottish biblical scholar: b. Carpow, Perthshire, 1722; d. 19 June 1787. By his own intense application to study he became acquainted with the French, Italian, German, Arabic, Persian, Syriac, and Ethiopic languages, as well as the Greek and Hebrew. He became pastor at Haddington, Scotland, in 1751, and remained in that relation till his death, though called to a pastorate in the Dutch Reformed Church in New York in 1784. In general he preached three sermons every Sabbath day. He was appointed professor of theology to the Associate Synod in 1768. His most important works are: 'The Self-interpreting Bible'; 'Dictionary of the Bible'; 'Explication of the Assembly's Catechism'; 'The Christian Journal'; 'Explication of Scripture Metaphors'; 'System of Divinity'; 'General History of the Church'; 'Particular History of the Churches of England, Scotland, and Ireland'; and 'Harmony of Scripture Prophecies.' His 'Dictionary of the Bible,' and 'Self-Interpreting Bible,' so called from the copious marginal references to other passages of Scripture by which it is distinguished, have gone through many editions.

Brown, John, Scottish physician, author of the Brunonian system in medicine: b. Buncle, Berwickshire, 1735; d. London, 17 Oct. 1788. His parents were in a very humble sphere in life, his father being merely a day laborer. Like the children of other Scottish cottars, however, he received the advantage of being educated at the parish school, where he was very soon distinguished for his abilities, and the rapid progress he made in his studies. His father having died, his mother married a weaver, and young Brown was bound an apprentice to that business; but the distaste he evinced for it was so great as to induce his stepfather to cancel his indentures, and remove him to the grammar school of Dunse, where he was looked upon as a prodigy—reading all the Latin authors with the greatest facility, and soon making considerable progress in Greek. In 1755 he went to Edinburgh, with the intention of studying divinity and entering the Church, but soon abandoned his theological studies. Having been employed by a medical student to translate his thesis into Latin, he succeeded so well that the elegance and purity of the language attracted the notice and encomiums of the professors and led to his commencing the study of medicine. In the year 1765 he married, and opened a boarding house for the accommodation of medical students; but being irregular and intemperate in his habits was soon reduced to bankruptcy. Having taken the degree of doctor in medicine at St. Andrew's, he commenced practice in Edinburgh, and produced his celebrated work, entitled the 'Elements of Medicine.' He then commenced lecturing on the practice of physic, and made use of this work as his text-book. He divided all diseases into two classes, those resulting from a deficiency, and those resulting from an excess of excitement; the one class to be treated with stimulants, the other with debilitating medicines. Becoming involved in pecuniary embarrassments he removed to London in 1786. The sys-

BROWN

tem of physic which he taught, though no longer accepted as a system, had a distinct influence on subsequent practice.

Brown, John, American merchant: b. Providence, R. I., 27 Jan. 1736; d. there, 20 Sept. 1803. A man of energy and enterprise, he developed the industry and extended the trade of his native city in a notable degree, being, it is said, the first merchant in Rhode Island to carry trade to China and the East Indies. Though having large interests at stake in the existing order of things, he was a leader in the cause of the American Revolution, and headed the party which destroyed the Gaspée in Narragansett Bay, 17 June 1772. He was chosen a delegate to the Continental Congress in 1784, but did not take his seat in that body. When Rhode Island refused to adopt the national Constitution, he did more than any other man toward securing the final reversal of that opposition. From 1799 to 1802 he was a representative in Congress. He at all times fostered the interests of the Baptist Church, contributed largely to the endowment of the present Brown University, laid the cornerstone of its original hall, and was its treasurer from 1775 to 1796.

Brown, John, American soldier: b. Sandisfield, Mass., 19 Oct. 1744; d. Stone Arabia, N. Y., 19 Oct. 1780. He graduated at Yale 1771, studied law in Providence, R. I., and in 1773 settled in Pittsfield, Mass., where he identified himself actively with the patriot cause. In 1775 he was a delegate to the provincial Congress, and was with Ethan Allen at the capture of Ticonderoga. In the same year he assisted in the capture of Fort Chambly, planned the attack on Montreal which resulted disastrously, and was at the storming of Quebec. Congress commissioned him a lieutenant-colonel in 1776, and in 1777 he conducted an expedition against Ticonderoga and the posts in its vicinity, releasing one hundred American prisoners and capturing large quantities of stores and provisions. Soon after this he retired from the service on account of his detestation of Arnold. At Albany in the winter of 1776-7 he published a handbill denouncing Arnold, predicting that he would become a traitor, and closing with the remarkably prophetic words, "Money is this man's God, and to get enough of it he would sacrifice his country." Brown was afterward employed in the Massachusetts service, and in the autumn of 1780, with the Berkshire militia, marched up the Mohawk valley for the relief of Schuyler and to act as circumstances might require. He was killed in ambush with 45 of his men at Stone Arabia, in Palatine, on his birthday.

Brown, John, Scottish clergyman: b. Whitburn, Linlithgowshire, 12 July 1784; d. Edinburgh, 13 Oct. 1858. He was ordained pastor of the burgher congregation at Biggar in 1806. In 1821 he removed to the care of the United Secession Church, Edinburgh, and afterward that of the Broughton-place Church. The burgher and anti-burgher seceders having come together in 1820, under the name of the united associate synod, he was chosen one of their professors of divinity in 1835. He took the part of the parent society on the division in the British and Foreign Bible Society, concerning the circulation of the Apocrypha, and the voluntary side on the question of church establishments. Having, by residence within the royalty of the

city of Edinburgh, become liable to the payment of an annuity tax, which was levied upon him, for the support of the city ministers, he refused to pay, and suffered his goods to be distrained; and in reply to the proceedings of the civil authorities, he preached and published two sermons on the "Law of Christ Respecting Civil Obedience, Especially in the Payment of Tribute," which, with notes and additions, became finally an octavo volume. In 1847 he and his congregation entered the United Presbyterian Church. Other works of his are: "The Resurrection of Life" (1852); "Expository Discourses on the Epistle of Saint Peter" (1848); "Discourses and Sayings of Christ" (1850).

Brown, John, American abolitionist leader: b. Torrington, Conn., 9 May 1800; d. 2 Dec. 1859. His paternal ancestry was of Mayflower stock, his grandmother of Welsh, his mother of Dutch. His grandfather was a captain in the Revolution. His father, who drew his abhorrence of slavery from Jonathan Edwards, an anti-slavery champion, shared in the forcible rescue of fugitive slaves in 1798. The son found his warrant against slavery in the Bible, where its defenders found their warrant for it. From the age of five he grew up in Ohio. He was an exceedingly active and adventurous boy, who loved play-fights, but not real ones, disapproved of war, and in manhood paid annual fines rather than perform militia duty. His detestation of slavery was confirmed by witnessing the abuse of a slave boy; he swore in his own words, "eternal war against slavery"; and throughout his career he never lost sight of this life-work. His 12 children who grew to maturity (out of 20 he had by two wives) were ingrained with his spirit, pledged themselves to him in prayer to spend their lives making it operative, and bore great privations to furnish him the means of so doing. He became a farmer and leather-dresser, surveyor, shepherd, and wool dealer; unfixed, unprosperous, and esteemed "shiftless." This was certainly not due to indolence or lack of honor; his immense family and want of money-getting faculty were partly responsible, his absorption in a fixed idea and lack of interest in money-getting still more. By 1834, then in Pennsylvania, he had devised an association of abolitionist families to educate colored youth, believing that it would force the South into speedy emancipation. Seeking co-operation in this plan, he removed to Ohio in 1835, and to Massachusetts in 1846; in 1840 he made surveys of Oberlin College lands in Virginia, and projected a negro colony there. In 1846 Gerrit Smith (q.v.) offered 100,000 acres of northern New York lands in small farms to colored families who would clear them; and in 1848, to work among them, Brown bought a farm in North Elba, where his family lived till his death, working with and for him. History can hardly parallel so large a family's unanimity of self-sacrifice for a social ideal, in whose behalf they stinted themselves ungrudgingly: a testimony to the father's commanding nobility of soul. From thence, by grace of contributions from abolitionists who had come to know and respect him, he traveled often on errands of organizing resistance to slavery. In 1850, after the passage of the Fugitive slave law, he visited Springfield, Mass., his former residence, and formed a "League of Gileadites," sworn to stand by each other in the rescue of fugitive slaves.

BROWN

In 1854 Kansas had become, in the eyes of both South and North, the decisive battle ground of the two systems, and five of Brown's sons living in Ohio set out thither to swell the free-soil ranks; they settled a few miles from Ossawatimie, and Brown joined them in October 1855, against his intention. The family were among the most stalwart defenders of the Territory for the next two years against the fraud and terrorism by which the Border Ruffians plunged it into anarchy and bloodshed. John Brown's career there brought him into national prominence, from the conspicuousness of the stage rather than the magnitude of the actions. Its most dramatic incidents were the retaliatory murder of five pro-slavery men at Pottawatomie, 24 May 1856, the capture of Capt. Pate at Black Jack, 2 June, and the magnificent defense of Ossawatimie against a crushing force of Missourians in August. It has never been narrated, even by Northerners without sympathy for the slavery cause, except with strong partisan bias pro or con, and from its very nature, it probably never can be. The judgment passed on it depends not merely on the view taken of his cause (of which an impartial estimate is not impossible), but on the questions whether that cause would have succeeded in any event, and whether he helped or harmed it. No proof of either is possible, and favor or disfavor toward fanatical enthusiasts is one of the deepest lines of cleavage among human spirits. As the victory for freedom was won, it is the fashion to assume that it never was in doubt; that active warfare was needless; that the influx of free settlers would soon have caused the pro-slavery invaders to desist in despair; that Brown acted as a lawless ruffian who justified the other party, and that he only discredited and hampered his own side. But it is still quite rational to maintain the older view, of which the premises are certainly correct, whatever the deduction may be. The pro-slavery party had no such illusions; from the first they openly proclaimed the struggle for Kansas a war for life or death, and carried it on by the machinery of war. They constituted a government by open fraud and maintained it by open violence; sacked towns, burnt houses, assassinated some of their opponents, and illegally imprisoned others; while the United States courts dispersed their foes by legal anathemas, and the United States troops acted as their army. If no resistance had been offered, it is not apparent why these methods should have been less employed or less successful in 1858 than in 1856; the prize would not have been less and the incentive would have grown greater. It is certain that such peaceful submission of the free-soilers would have been hailed by the Pierce and Buchanan parties as proof incontestable that the Republican charges of illegality and outrage were mere libels. It is therefore at least arguable that it was Brown, Montgomery, Lane, and the other fighters, by their stubborn and "lawless" defiance to sheer foreign conquest, plunging Kansas into open and bloody anarchy, who shamed the government into withdrawing its help to the invaders, and convinced the slavery party that force was no longer available. Incidentally, they gave the non-combatants a free community in which to decry their champions.

Whatever may be the judgment now, the Eastern abolition leaders at that time had no

thought of suppressing him: they furnished him some moneys and supplies for whatever plan he privately deemed best, feeling sure at least of some bold heartening stroke for the cause. For many years he had entertained the project of establishing, in the Maryland or Virginia mountains, a stronghold for fugitive slaves, where they could withstand attacks and if necessary reach Pennsylvania. He thought the knowledge of this refuge might stimulate the slaves into a dash for freedom, and the insecurity of slave property might drive the South into emancipation. That he could suppose the United States would allow such a guerrilla fortress and firebrand within its jurisdiction for a day, seems scarcely compatible with sanity, but Brown was insane only as all religious, intense idealists tend to become so. At the last, his plan developed into one for a stroke that should startle the country into action, draw recruits to him, and leave no chance for compromise or delay. Characteristically, he seems not to have doubted that the country would stand by him. He chose to assault the United States arsenal at Harper's Ferry, thus not only securing arms for his presumed fugitives, but making the country ring; without reflecting that this was open war against the nation, and that even the abolitionists could not uphold him. In 1857 he began drilling a small band of adherents at Tabor and Springfield, Iowa, but his trusted drillmaster, Forbes, gave the alarm, and the scheme was postponed. At length, in June 1859, he and some of his men hired a farm near Harper's Ferry, and two of his women came to keep house there; he gradually collected the remainder, 22 men besides himself, with some arms; and late Sunday evening, 16 October, with 18 men, seized the armory and took possession of the village. He made hostages of some leading citizens, and had a few neighboring planters and their slaves brought in. But the remaining citizens armed themselves, assailed and shot several of Brown's men, and surrounded the rest, and on Monday evening Col. Robert E. Lee came from Washington with a company of marines, and cooped Brown and his six remaining men into the engine-house. Brown fought there till the two sons with him were killed, and himself supposed to be mortally wounded, before he would surrender. Why he had not retreated to the mountains on capturing the arsenal was never explained, even by himself. He was tried before a Virginia court, but defended by Massachusetts counsel, sentenced as was inevitable and just, and hanged at Charlestown, W. Va. His testimony on the trial, and his demeanor and language all through, produced an ineffaceable impression on the North, revealing a character of heroic simplicity, purity, and grandeur; if his action was mad, he himself was not; and even his adversary, Gov. Wise, of Virginia, admired his "clear head, courage, fortitude, and simple ingenuousness," and felt him to be wholly truthful. The actual importance of the Harper's Ferry raid, in determining or hastening secession, has always been exaggerated, by his friends as praise and by his foes as detraction: to suppose that secession would not have come after Lincoln's election, had there been no such raid, is to ignore all American history for many years previous. But the revolt of the slave power seemed to justify his prevision and action; he became the popular

BROWN

incarnation of the spirit of liberty, its great pioneer and martyr; and the slogan of the North was: "John Brown's body lies a-mouldering in the grave, but his soul goes marching on!" His nature had something of the sublime; and great natures have their function and service as well as great intellects. No community could exist with such men for statesmen; perhaps none can be great without some such men for prophets.

Brown, John, Scottish physician and essayist, son of John Brown (1784-1858 q.v.): b. Biggar, 22 Sept. 1810; d. Edinburgh, 11 May 1882. He graduated in 1833 and began practice as a physician. His leisure hours were devoted to literature, many of his contributions appearing in the 'North British Review,' 'Good Words,' and other periodicals. His collected writings, published under the title of 'Horæ Subsecivæ, (leisure hours) (1858-82), embrace papers bearing on medicine, art, poetry, and human life generally. Several of his sketches, such as 'Rab and His Friends,' 'Our Dogs,' 'Pet Marjory,' 'Jeems the Doorkeeper,' on which his fame chiefly rests, have been published separately. Humor, tenderness, and pathos are his chief characteristics. See Peddie, 'Recollections of Dr. John Brown' (1893).

Brown, John George, Anglo-American painter: b. Durham, England, 11 Nov. 1831. He was educated in the common schools in Newcastle-on-Tyne, and came to the United States in 1853. He studied in the schools of the National Academy of Design; was elected an academican in 1863; received honorable mention at the Paris Exposition in 1889; and in 1900 was president of the American Water Color Society. He is best known for his pictures of bootblacks and street urchins. Among his famous pictures are: 'A Merry Air with a Sad Heart'; 'The Stump Speech'; 'The Passing Show'; 'Be Mine'; and 'Training the Dogs.'

Brown, John Hamilton, American inventor: b. Liberty, Maine, 28 July 1837. At the age of 18 he was apprenticed to a gunsmith and in 1857 entered business in Haverhill, Mass. He served in the Civil War as a sharpshooter, and in 1882 was a member of the American Rifle Team at Wimbledon. He began in 1883 to perfect the invention of a weapon for military use later known as the Brown segmental wire-wound gun, which, after numerous government tests, was pronounced a success.

Brown, John Howard, American editor: b. Rhinebeck, N. Y., 8 Nov. 1840. After studying law in New York and engaging in journalism in Washington, D. C., and Augusta, Ga., he became a publisher in New York. In 1896 he removed to Boston to become editor-in-chief of 'Lamb's Biographical Dictionary of the United States.' He is the author of 'American Naval Heroes' (1898), and of numerous contributions to periodical literature.

Brown, John Lewis, French artist: b. Bordeaux, 16 Aug. 1829; d. 1892. He studied under Belloc and Roqueplan and was famous as an impressionist painter of military and hunting scenes, as well as of studies of horses and dogs. Among his numerous works are: 'Steeple Chase' (1861); 'At the Outposts' (1865); 'Relay of Omnibus Horses' (1884); 'Hohenlinden' (1887).

Brown, John Newton, American Baptist clergyman: b. New London, Conn., 29 June 1803; d. 1868. He studied at what is now Colgate University, Hamilton, N. Y., and filled successive pastorates at Buffalo, N. Y.; Providence, R. I.; Malden, Mass.; and Exeter, N. H. While at Exeter he commenced his literary labors by editing the 'Encyclopædia of Religious Knowledge' (1835). In 1838 he became a professor of exegetical theology and ecclesiastical history in the New Hampton theological institution, N. H., where he remained till 1845. He edited 'The Christian Chronicle and National Baptist' (1849-68), and was the author of 'The New Hampshire Confession' (1852).

Brown, John W., American author: b. Schenectady, N. Y., 21 Aug. 1814; d. Malta, 9 April, 1849. He graduated at Union College in 1832, and was settled as an Episcopal minister at Astoria, N. Y. In 1845 he became editor of the 'Protestant Churchman.' He was the author of the 'Christmas Bells, a Tale of Holy Tide, and Other Poems,' and of several prose tales of a religious character.

Brown, John Young, American lawyer: b. Claysville, Hardin County, Ky., 28 June 1835; d. Henderson, Ky., 11 Jan. 1904. He graduated at Center College, Danville, 1855, studied law, and was admitted to the bar. In 1859 he was elected to Congress, but not having attained the constitutional age, could not take his seat. He was again elected to Congress in 1868, but his seat was refused him by the House because of political disabilities. Finally he served in Congress (1873-7). He retired to the practice of law and during 1891-5 he was Democratic governor of Kentucky.

Brown, Joseph Emerson, American statesman: b. Pickens County, S. C., 15 April 1821; d. Atlanta, Ga., 30 Nov. 1894. He was educated at Calhoun Academy, and graduated at Yale in 1846. He settled in Canton, Ga.; served in the State legislature, and was elected governor in 1857; serving three terms. As war governor he opposed Jefferson Davis in the matter of the conscription laws and raised 10,000 recruits to oppose Sherman's march to the sea; but would not allow them to leave the State. After the war he gave hearty support to the reconstruction measures, and supported Gen. Grant for the presidency. He was Chief-Justice of Georgia in 1868, and United States Senator in 1880-91.

Brown, Lancelot, English landscape gardener, sometimes called "Capability Brown": b. at Kirkharle, 1715; d. 1773. He commenced life as a kitchen gardener, but, by his industry and genius, rose rapidly in public estimation till he came to be regarded as a kind of oracle in taste in regard to all rural improvements, agricultural, horticultural, and even architectural. His extensive employment enabled him to realize a handsome independence, and he adorned the station to which he had worked his way with more graces and virtues than are often displayed by those who have been born to it. He obtained the dignity of high sheriff of Huntingdon in 1770. He avoided the stiff formality of the older landscape gardens, but is charged with having often sinned against good taste by endeavoring to reform natural scenery, and force it, under all circumstances, to assume

BROWN

the form of clumps, belts, and serpentine canals. His architectural performances are remarkable for their interiors.

Brown, Moses, American naval officer: b. Salisbury, Mass., 1742; d. at sea 1804. He was a sailor in early life, and commanded the United States privateer *General Arnold*. He was the first commander of the sloop of war *Merrimac*, having the rank of captain U. S. N. He was retired by Thomas Jefferson and re-entered the merchant service.

Brown, Nicholas, American merchant and philanthropist: b. Providence, R. I., 4 April 1769; d. there, 27 Oct. 1841. He graduated at Brown University, 1786. Through the death of his father in 1791, he inherited a handsome fortune, formed a partnership with his brother-in-law, Thomas P. Ives, and became one of the most successful and best-known merchants of America. He was a nephew of John Brown (1736-1803, q.v.). In 1792 he gave \$500 to Brown University with which to purchase law books. This was the beginning of a long series of endowments and benefactions to that institution, which took its present name in honor of him in 1804, when he endowed a professorship of oratory and *belles-lettres*. In 1822 he built Hope College, at an expense of \$20,000; Manning Hall in 1834, at a cost of \$18,500; and a president's house in 1840, costing \$7,000. The total of his various gifts amounted to \$160,000. He was a trustee from 1791 to 1825; a fellow, 1825-41, and a most efficient treasurer from 1796 to 1825. He was also a generous donor to the Providence Athenæum and Butler Hospital for the Insane. He served several terms in the State legislature, and in 1840 was a presidential elector.

Brown, Oliver Madox, English artist, son of Ford Madox Brown (q.v.): b. 1855; d. 1874. From early boyhood he showed remarkable capacity both in painting and literature, especially prose fiction and poetry. His two most promising pictures were 'The Tempest — Prospero and the Infant Miranda' (exhibited in 1871 at the International Exhibition, South Kensington), and 'A Scene from Silas Marner' (1872). 'Gabriel Denver' (1873), and some other unfinished novels, besides sonnets and other poems, show wonderful literary power in one so young. His 'Literary Remains' were published in 1876.

Brown, or Browne, Robert, English clergyman, the founder of a religious sect first called "Brownists," and afterward "Independents": b. Toilethorpe, Rutlandshire, about 1550; d. Northampton, about 1633. He studied at Cambridge, from whence, in 1572, he removed to London. Here he supported himself by teaching; but soon returned to Cambridge and began openly to attack the government and liturgy of the Church of England as anti-Christian. He first ascended the pulpit at Norwich in 1581, where he succeeded in converting a number of Dutch, who had a congregation there, to his opinions. He then went to Middleburg, in Holland, with his followers, and wrote a book called 'A Treatise of Reformation without Tarrying for any Man.' In 1586 he returned to England, and, as he still labored to gain converts, was excommunicated by the Bishop of Peterborough. This censure, joined perhaps

with the evaporation of his zeal, induced him to submit, and in 1586 he became master of Stamford Grammar School, a post which he occupied till 1590, when he was presented to the living of Acworth, in Northamptonshire. He died in Northampton jail, where he had been sent for assaulting a constable. The sect of Brownists, far from expiring with their founder, soon spread so as to become a subject of great alarm; and a bill was brought into Parliament which inflicted on them very severe pains and penalties. In process of time, however, the name Brownists was merged in that of Congregationalists, or Independents, under the latter of which titles they formed a powerful party in the commonwealth.

Brown, Robert, Scottish botanist: b. Montrose, 21 Dec. 1773; d. London, 10 June 1858. He finished his education in 1795, when he became ensign and assistant surgeon in a Fife-shire fencible regiment, which he accompanied to Ireland, remaining there till 1800. He was then, through the influence of Sir Joseph Banks, appointed naturalist to Capt. Flinders' surveying expedition to Australia or New Holland. The whole continent of Australia was circumnavigated, the coast at various points examined, and Brown remained in the colony, visiting various parts of New South Wales and Van Diemen's Land, till 1805. He returned with nearly 4,000 species of plants, was shortly after appointed librarian to the Linnæan Society, and was now able to devote himself to the systematic study of his plants. He continued to make the result of his investigations known in communications to the Linnæan and Royal societies. One of his earliest papers was on a group of the family of plants named by Jussieu *Apocynæ*, which he succeeded in establishing as a separate family under the title already given them by Jussieu of *Asclepiadeæ*. In 1810 he published the first volume of the great work he had been preparing on the plants of Australia and Tasmania, entitling it 'Prodromus Floræ Novæ Hollandiæ et Insulæ Van Diemen.' No second volume of it ever appeared. He was the first English writer on botany who adopted the natural system of classification which has since entirely superseded that of Linnæus. In 1814 he published a botanical appendix to Capt. Flinders' account of his voyage, entitled 'General Remarks, Geographical and Systematical, on the Botany of Terra Australis.' In 1828 he published a brief 'Account of Microscopical Observations on the Particles Contained in the Pollen of Plants, and on the General Existence of Active Molecules in Organic and Inorganic Bodies.' He was the first to call attention to the presence of these active molecules. The movement of the granules of the foveola (or semi-fluid matter contained in the pollen grains) which he believed to be purely physical, or non-organic, has on the Continent acquired the name of the Brownian or Brunonian movement. He also wrote botanical appendices for the voyages of Ross and Parry, the African exploration of Denham and Clapperton and others, and described, with Dr. Bennet, the plants collected by Dr. Horsfield in Java. In 1810 he received the charge of the collections and library of Sir Joseph Banks, which were afterward bequeathed to him for life. He transferred them in 1827 to the British Museum, and was appointed

keeper of botany in that institution. He became a Fellow of the Royal Society in 1811, D.C.L. of Oxford in 1832, a foreign associate of the French Academy of Sciences in 1833. He had the Copley medal in 1839, and was appointed president of the Linnæan Society in 1849. He also received the decoration of the highest Prussian order of civil merit, presided over by Baron Humboldt, who called him *Botanicorum facile princeps*. As a botanist Brown occupied the very highest rank. He made the microscope and the study of development the basis of his classification; and by his skill in the application of ascertained facts to the elucidation of obscure and the explanation of doubtful phenomena, greatly advanced our scientific knowledge of the vegetable kingdom. His works, contained chiefly in the 'Transactions' of learned societies and other inaccessible forms, are not of a nature to be popular.

Brown, Robert, Scottish scientist: b. Campster, Caithness-shire, 1842; d. 1896. He explored the coast of Spitzbergen, Greenland, and the western shore of Baffin Bay in 1861, made charts of the interior of Vancouver, and with Whymper, in 1867, made discoveries as to the inland ice of Greenland, since borne out by those of Peary. He traveled extensively in the Barbary States, lectured on scientific themes in Glasgow and Edinburgh, and was a member of learned societies in Europe and America. He published 'Manual of Botany' (1874); 'Peoples of the World' (1882-5); 'Science for All' (1877-82).

Brown, Sir Samuel, English engineer: b. London, 1776; d. Blackheath, Kent, 15 March 1852. After serving with honor in the English navy he was made a retired captain in 1842. He is remembered for his system of making iron chain cables, and as the designer and builder of the earliest iron suspension bridge in England, at Berwick-on-Tweed. The famous chain pier was designed by him. He was knighted in 1838.

Brown, Samuel, Scottish chemist and poet: b. Haddington, 23 Feb. 1817; d. Edinburgh, 20 Sept. 1856. He graduated from the University of Edinburgh with extraordinary attainments, began his public career by delivering, in 1840, in association with his intimate friend, Edward Forbes, a course of lectures on the philosophy of the sciences, and having established among his auditors, as he had before among his teachers, the conviction that he was destined to great achievement, renounced all else that he might have won, to devote himself to the slow experimental realization of a great scientific conception. In 1849 he delivered in Edinburgh a series of lectures on the history of chemistry, tracing its progress from its playful childhood among the Greeks, through the Oriental and Mediæval alchemists, with most fascinating sketches of Roger Bacon and Paracelsus; passing thence through the epoch of Stahl and Priestley, till the young and unfortunate Lavoisier changed the whole form of chemical science, opening a new path to all succeeding philosophers. In 1850 he published the 'Tragedy of Galileo.' Many of his lectures and essays have been collected since his death, under the title of 'Lectures on the Atomic Theory, and Essays Scientific and Literary.'

Brown, Samuel Robbins, D.D. (1810-80), American scholar, educator and missionary: b. East Windsor, Conn., 16 June 1810; d. Munson, Mass., June 1880. He established the first Christian Protestant school in China, brought the first Chinese students to America for education, and was the chief instrument in establishing (at Elmira, N. Y.) the first woman's college in America, chartered as such, and translated the New Testament into Japanese 13 days after the formation of the American Board of Commissioners for Foreign Missions. His mother was Phoebe Hinsdale, one of the first and best known of American hymnologists. Educated at Munson Academy, Yale College and the Theological Seminary at Columbia, S. C., he supported himself most of the time by teaching music, one of his pupils being Miss Bulloch, who became the mother of President Theodore Roosevelt. He sailed with his young bride in 1838 to China and at Macao organized and taught in the school of the Morrison Education Society, which was later removed to Hong Kong, where Dr. Brown was wounded by pirates. He returned to America in 1847, bringing with him Yung Wing (who afterward brought 120 Chinese students to America) and Wong, who became a famous physician. Most of Dr. Brown's Chinese pupils rose to positions in the Imperial Customs and other Government services, which required a knowledge of English. Remaining in America until 1859, as pastor and teacher at Owasco Lake, N. Y., he went out to Japan to found the mission of the Reformed Church in America. He trained up a native ministry and many Japanese pupils who have since become editors, statesmen, scholars, presidents of colleges, or otherwise active in the remaking of the Japanese Empire. He wrote the first Grammar of Colloquial Japanese and other works for the mastery of the language, and made scholarly translations besides the whole of the New Testament. See his life, 'A Maker of the New Orient' (1902), by William Elliot Griffis.

Brown, Sanger, American physician: b. Bloomfield, Ontario, 16 Feb. 1852. He was graduated from the Bellevue Hospital Medical College, New York, 1880, and has since held several important professional posts, becoming professor of neurology in the Post Graduate Medical School of Chicago in 1890. He was the earliest to demonstrate that the occipital lobe is the centre of vision in monkeys.

Brown, Thomas, Scotch metaphysician: b. Kirkmabreck, Kirkcudbright, 9 Jan. 1778; d. London, 2 April 1820. He was educated at the University of Edinburgh, where he obtained the professorship of moral philosophy. He distinguished himself, at a very early age, by an acute review of the medical and physiological theories of Dr. Darwin, in a work entitled 'Observations on Darwin's Zoonomia.' But he chiefly deserves notice on account of his metaphysical speculations, his chief work being 'Lectures on the Philosophy of the Human Mind' (1822). His system reduces the intellectual faculties to three great classes—perception, simple suggestion, and relative suggestion, employing the term suggestion as nearly synonymous with association. His development of the theory of cause and effect was first suggested by Hume.

Brown, Thomas Edward, English poet: b. Isle of Man, 1830; d. Clifton, England, 29 Oct. 1897. After a brilliant career at Christ Church College, Oxford, he became assistant master at Clifton College, Bristol, in 1862, resigning in 1892. His work, though strong and remarkably original, failed to attract general attention during his lifetime, but when collected in 1900, contemporaneously with two volumes of his 'Letters,' they drew forth extended notices from leading critical reviews and journals in England and the United States. His poems, which are written in Anglo-Manx dialect for the most part, are chiefly narrative, and include 'Betsy Lee' (1873); 'Fo'c's'le Yarns, including Betsy Lee' (1881); 'The Doctor and Other Poems' (1887); 'The Manx Witch and Other Poems' (1889); 'Old John and Other Poems' (1893).

Brown, Sir William, English merchant and philanthropist: b. Ballymena, Ireland, 1784; d. 1864. In 1800 he removed with his parents to Baltimore, Md., and became the partner of his father in the linen trade there. In 1809 he set up a branch of the business in Liverpool and subsequently founded the famous mercantile house of Brown, Shipley & Company. He sat in Parliament four years from 1846, advocated free trade and decimal coinage, gave \$200,000, in 1857, to establish a free public library in Liverpool, and built the original library building and museum there.

Brown, William Garrott, American writer: b. Marion, Ala., 24 April 1868. He graduated at Harvard in 1891, taking highest honors in history, and became assistant in the Harvard Library. In 1892 he took an active part in the Presidential campaign, serving on various committees and stumping Massachusetts in behalf of Cleveland. He has made a special study of Southern history, and since 1900 has devoted himself to writing and lecturing on this topic, contributing chiefly to the 'Atlantic Monthly.' His writings in book form are: 'Andrew Jackson' (1900); 'History of Alabama' (1901); 'The Lower South in American History' (1902); 'Stephen A. Douglas' (1902); 'Golf' (1902); 'History of the United States Since the Civil War' (1903); 'A Gentleman of the South' (1903).

Brown, William Montgomery, American Protestant Episcopal bishop: b. Orrville, Ohio, 6 Nov. 1855. He entered the Episcopal ministry, became archdeacon of Ohio in 1891, and in 1898 was consecrated coadjutor bishop of Arkansas, becoming bishop of that diocese in the year following.

Brown-Séguard, Charles Edouard, shārl ā-dd-ār brown-sā-kār, Franco-American physiologist and physician: b. Mauritius, 1818; d. Paris, 1 April 1894. His father was a sea captain from Philadelphia, who married on the island a lady named Séguard. The son studied in Paris and graduated M.D. in 1846. He devoted himself mainly to physiological research, and received numerous prizes, French and British, for the results of valuable experiments on blood, muscular irritability, animal heat, the spinal cord, and the nervous system. In 1864 he became professor of physiology at Harvard, but in 1869 returned to Paris as professor of pathology in the School of Medicine. In 1873 he

became a medical practitioner in New York, treating especially diseases of the nervous system; and in 1878 succeeded Claude Bernard as professor of experimental medicine at the Collège de France. He repeatedly lectured in England. His publications include lectures on 'Physiology and Pathology of the Nervous System' (1860); on 'Paralysis of the Lower Extremities' (1860); and on 'Nervous Affections' (1873).

Brown, the color produced when certain substances—wood or paper, for example—are scorched or partially burned. Brown is not one of the primary colors in a spectrum. It is composed of red and yellow, with black, the negation of color. It is also the name of a genus of colors, of which the typical species is ordinary brown, tinged with grayish or blackish. The other species are chestnut brown, deep brown, bright brown, rusty, cinnamon, red brown, rufous, glandaceous, liver-colored, sooty, and lurid.

Brown Bear. See BEAR, BROWN.

Brown Coal, a variety of bituminous coal, and formed like it of vegetable remains, but more woody or fibrous in its formation. It usually belongs to later formations than the common coal, and on this account has been called modern coal. Brown coal is at first hardly to be distinguished from common coal, but it has a brown streak when scratched, and when exposed to the air rapidly deteriorates, falling to powder in a few months, while the kind called lignite tears and splits. Brown coal contains much more water than common coal, and is thus less valuable as fuel. Where better fuel is scarce, however, it is largely used. See LIGNITE.

Brown Spar, a name given to the brown varieties of dolomite whose color is due to the presence of iron carbonate.

Brown Thrush, or Thrasher. See THRASHER.

Brown University, an educational institution in Providence, R. I. Its charter was granted by the General Assembly of the State in 1764 and the institution was opened in Warren in 1765 as Rhode Island College. Its founding was due to the wish of the Baptists to have a college under their own control and it has ever since been affiliated with the Baptist Church, although remaining unsectarian. The college was removed to Providence in 1770 and in 1804 its name was changed to Brown University in honor of Nicholas Brown (q.v.), whose various gifts to the college were not far from \$160,000 in amount. Under its fourth president, Francis Wayland (q.v.), 1827-55, the university was practically reorganized. Under President Elisha Benjamin Andrews (q.v.), 1889-98, the number of students increased from 268 to 860. In 1891 the Woman's College was founded, and in 1897 this was accepted by the corporation as the Woman's College in Brown University. Since the presidency of the Rev. W. H. P. Faunce began in 1899, the institution has grown very rapidly; a \$2,000,000 endowment has been secured; and several large and important buildings have been erected, including the John Carter Brown Library, the Administration Building, the Engineering Building, Caswell Hall, and Rockefeller Hall.

BROWNE

At the end of 1910 there were 95 professors and instructors, 993 students in all departments; in 1910 the productive funds were \$3,500,000, income, \$231,400, and there were 165,000 volumes in the library.
F. T. GULLA.

Registrar and Secretary of Faculty.

Browne, Charles Farrar (**'ARTEMUS WARD'**), American humorist: b. Waterford, Me., 26 April 1834; d. Southampton, England, 6 March 1867. He learned the printer's trade, and while working on the *Carpet Bag*, a Boston comic weekly, began his career as one of the most widely popular of American writers and lecturers. 'Artemus Ward's Sayings,' written for the *Cleveland Plain Dealer*, extended his fame as a clever and witty writer. His humorous lectures, especially those on Mormonism, proved most successful in this country and in England. He died of consumption while on a lecture tour in the latter country. Browne's humor had a quality of its own, and was essentially democratic and American. His winning personality never failed to put an audience in a receptive mood. His works in book form are: 'Artemus Ward: His Book' (1865); 'Artemus Ward: His Travels Among the Mormons' (1865); 'Artemus Ward: His Book of Goaks' (1865); 'On the Rampage' (1865); 'Artemus Ward Among the Fenians' (1865); 'Artemus Ward in London' (1867); 'Artemus Ward's Lecture at Egyptian Hall' (1869). While in England he made several contributions to 'Punch,' beginning with the number for 1 Sept. 1866. Compare M. D. Landon's biographical sketch, prefixed to 'Artemus Ward, His Works Complete' (1875).

Browne, Charles Francis, American artist: b. Natick, Mass., 21 May 1859. He studied at the Boston Art Museum, the Philadelphia Academy of Fine Arts, and the Paris Ecole des Beaux Arts. He has been for some years lecturer and instructor in the history of art in the Chicago Art Institute, and has exhibited both in this country and Europe.

Browne, Edward Granville, English Orientalist: b. Uley, England, 7 Feb. 1862. He was educated at Eton and Pembroke College, Cambridge. He traveled in Persia (1887-8), becoming lecturer in Persian at Cambridge in the year last named. He has published 'A Traveler's Narrative, Written to Illustrate the Episode of the Báb,' Persian text and English translation with notes (1891); 'The New History of Mirzá and Ali Muhammad the Báb' (1893); 'A Year Amongst the Persians' (1893).

Browne, Edward Harold, English prelate: b. Aylesbury, Buckinghamshire, 6 March 1811; d. Winchester, Hampshire, 19 Dec. 1891. He was educated at Emmanuel College, Cambridge, took orders in the Anglican Church in 1836, and was consecrated Bishop of Ely in 1864. In 1873, he was transferred to Winchester, resigning this bishopric in 1891. He was a prominent advocate of the old Catholic movement in Germany and one of the Old Testament company of revision of the King James version of the Bible. He published 'An Exposition of the XXXIX. Articles' (1850-3); 'Sermons on the Atonement and Other Subjects' (1859); 'The Messiah Foretold and Expected' (1862); 'The Pentateuch and the Elohistic Psalms in Reply to Bishop Colenso' (1863); 'The Stripe, the Victory, and the Kingdom' (1872); 'Position

and Parties of the English Church' (1875); 'Commentary on Genesis' in the 'Speaker's Commentary.'

Browne, Frances, Irish poet: b. Stranorlar, Donegal, Ireland, 16 June 1818. When she was 18 months old she lost her sight from small-pox. From her brothers and sisters attending the village school she obtained as much information as they were acquiring, and listened to such books as they would read to her. 'Robinson Crusoe' and 'Mungo Park's African Adventures' were among these works. The prose writings of Sir Walter Scott, with which she became familiar from their being read to her, deeply influenced her mind. In 1841 she commenced contributing verse to the 'Athenæum,' edited at that time by Mr. T. K. Hervey. He became interested in her story, related it with considerable effect in the 'Athenæum,' paid her for her writings, and introduced her to other publications, from which she also derived pecuniary benefits. In 1844 the 'Star of Atteghel' and other poems appeared in a small volume, which was well received. Among the advantages accruing to the poet from it, was her being placed on the pension list for £20 a year by Sir Robert Peel, prime minister.

Browne, Francis Fisher, American editor and author: b. South Halifax, Vt., 1 Dec. 1843. During the Civil War he served in the 46th Massachusetts Volunteers. He edited the 'Lakeside Monthly,' 1869-74, and in 1880 became editor of 'The Dial,' Chicago, which under his direction has come to be one of the two or three American literary journals worthy of being ranked with the best English periodicals of similar scope. Publications: 'Every-day Life of Abraham Lincoln' (1886); 'Volunteer Grain' (1896), poems. He has edited 'Golden Poems by British and American Authors' (1881); 'Golden Treasury of Poetry and Prose' (1883); 'Bugle Echoes: a Collection of Poems of the Civil War' (1886).

Browne, George Forrest, English bishop: b. York, England, 1833. He was educated at St. Catharine's College, Cambridge, and ordained 1858. He was appointed theological tutor and bell lecturer in ecclesiastical history in the Episcopal Church of Scotland, 1862; fellow and lecturer at St. Catharine's, 1863-5; secretary and chief organizer of the Cambridge local examinations. He was rector of Ashley, 1869-75; Disney professor of archaeology, 1887-92; canon of St. Paul's, 1891-7; bishop of Stepney, 1895-7, whence he was transferred to the see of Bristol. He is the author of 'Ice Caves of France and Switzerland' (1865); 'The Venerable Bede' (1879); 'University Sermons' (1878-80); 'The Ilam Crosses' (1880); 'Early English Church History' (1893); 'The Church at Home Before Augustine' (1894); 'Augustine and His Companions' (1895); 'Conversion of the Heptarchy' (1896); 'Theodore and Wilfrid' (1897); 'History of St. Catharine's College' (1902); 'Life and Works of St. Aldhelm,' and various publications of the Church History Society (1894-7).

Browne, George Waldo, American author: b. Deerfield, N. H., 8 Oct. 1851. For five years he edited 'American Young Folks,' and is a well-known writer for young people. He has written over 100 serials and several hundred short stories and articles for the leading juve-

BROWNE

nile periodicals. Of his books the best known are: 'The Woodranger' (1899); 'Two American Boys in Hawaii' (1899); 'Pearl of the Orient' (1900); 'Legends of the Hills' (1901). His most recent juveniles include 'For Home and Honor' (1902); 'From Switch to Lever' (1902); 'Zip the Acrobat' (1902); 'Comrades Under Castro' (1903); 'With Roger's Rangers' (1905).

Browne, Hablot Knight, English caricaturist, better known by his pseudonym of **PHIZ**: b. London, 15 June 1815; d. Hove, Brighton, 8 July 1882. He was educated at a private school, and at an early age began to draw caricatures with great spirit. In 1835 he succeeded Seymour as the illustrator of Dickens' 'Pickwick,' and so happy and successful was his pencil that he was engaged to illustrate 'Nicholas Nickleby'; 'Dombey and Son'; 'Martin Chuzzlewit'; 'David Copperfield,' and other works of that great novelist. He subsequently contributed many graphic illustrations to the novels of Lever, Ainsworth, Scott (the Abbotsford edition of the Waverley Novels), and to an illustrated edition of Byron, besides sending many comic sketches to the illustrated serials of the time. See Thompson, 'Life and Labors of H. K. Browne' (1884).

Browne, Isaac Hawkins, English poet: b. Burton-on-Trent, Staffordshire, 1706; d. 1760. He was educated at Trinity College, Cambridge, and called to the bar, but he did not practise. He wrote 'Design and Beauty'; 'The Pipe of Tobacco' (in which he imitates Pope, Young, Swift, and others); and a Latin poem, 'De Animi Immortalitate,' modeled on Lucretius and Virgil. The last-named received high commendation from the scholars of his time, and has been several times translated into English. Browne had a great reputation as a wit and conversationalist.

Browne, John Ross, American author and traveler: b. Ireland, 1817; d. Oakland, Cal., 9 Dec. 1875. He came to America when a child, his father settling in Kentucky. At the age of 18, having learned stenography, he went to Washington, and for several years was employed as shorthand reporter in the Senate. His desire for travel led him to take a whaling cruise, in the course of which he visited the greater part of the world. In 1849 he was a government commissioner in California, and reported the State Constitutional Convention proceedings. In 1851, and again in 1861, he traveled extensively in Europe and the Holy Land, visiting Iceland, Russia, Poland, and other countries. Commissioned by the government to study the mineral resources west of the Rocky Mountains, he presented an elaborate report, reviewing the mines, climate, topography, agriculture, commerce, etc., of that region. His books of travel were illustrated with humorous drawings of his own. He was United States minister to China in 1868-9. Publications: 'Etchings of a Whaling Cruise' (1846); 'Yusef: a Crusade in the East' (1853); 'Adventures in the Apache Country' (1869); 'The Land of Thor' (1866); 'Adventures of an American Family in Germany' (1867); 'Crusoe's Island, with Sketches of Adventures in California and Washoe' (1864); 'Resources of the Pacific Slope' (1869).

Browne, Junius Henri, American journalist: b. Seneca Falls, N. Y., 14 Oct. 1833; d. New

York, 2 April 1902. He was a graduate of Saint Xavier College, Cincinnati. In 1861 he became war correspondent for the New York *Tribune*, was wounded at Fort Donelson, and taken prisoner while engaged in an abortive expedition to run the Vicksburg batteries. After an imprisonment of 20 months in seven different prisons, he eluded his guard at Salisbury, N. C., traveled 400 miles through a hostile country, and reached the Union lines 14 Jan. 1865. His list of Union soldiers who died at Salisbury, published in the *Tribune*, is the only authentic account of their fate. After the War he served as correspondent of the New York *Tribune*, *Times*, and other journals, and contributed many articles to leading periodicals. His best-known works are: 'Four Years in Secessia' (1865); 'The Great Metropolis: A Mirror of New York' (1869); 'Sights and Sensations in Europe' (1872). A series of articles on women, which he wrote for the 'Galaxy,' created a sensation in literary circles. His 'Four Years in Secessia' was hastily prepared and lacked much grace and elegance in its literary form, but its descriptions of various incidents of the war and particularly its information concerning the conditions of the Southern prisons and the Northern soldier confined in them, render the book especially valuable.

Browne, Sir Thomas, English prosaist, scholar, and physician: b. 19 Oct. 1605, London, parish of Saint Michael, Cheapside; d. Norwich, 19 Oct. 1682. His father, who had been a mercer at Upton, in Cheshire, and came of an ancient and honorable family, died early; and Browne's mother soon married Sir Thomas Dutton. Browne received his early education at Winchester College, and in 1623 was sent as a fellow-commoner to Broadgate Hall (now Pembroke College) Oxford. Here he graduated B.A., 21 June 1626, and M.A., 11 June 1629. Early becoming interested in the natural sciences, he devoted most of his time at Oxford to the study of medicine, and for some time after graduation practised medicine in Oxfordshire. Later on, he accompanied his step-father to Ireland on a tour of inspection of its forts and castles. After this, Browne continued his travels through France and Italy, spending some time at the celebrated schools of physic at Montpellier and Padua, and doubtless acquiring some of the "six languages" which, "besides the jargon and patois of several provinces," he later stated that he understood. On his way back to England he traveled through Holland, where in 1633 the University of Leyden conferred upon him the degree of Doctor of Medicine. After his return, he established himself as a physician at Shipden Hall, near Halifax. He was much "resorted to for his skill in physic," and spent his leisure hours in study and contemplation.

At Shipden Hall, 1635-36, Browne composed the beautiful contemplative soliloquy known as the 'Religio Medici.' It was written for his "private exercise and satisfaction," and was not intended for publication. It was, however, widely circulated in manuscript among his literary friends, and was at last surreptitiously published in 1642 by Andrew Cooke. Browne, in self-defense, published a correct edition in 1643; and almost simultaneously appeared a series of

"Observations" on the work, penned in 24 hours by the eminent Sir Kenelm Digby. The book at once became immensely popular, both at home and abroad. In 1664, John Merryweather published a Latin version of it; and Dutch, French, and German translations appeared in 1665, 1668, and 1680 respectively. Because of the "daring skepticism" which it combined with "implicit faith in revelation," it was placed in the Index Expurgatorius of the Catholic Church. Between 1642 and 1881, the treatise ran through 33 English editions.

In 1637 Browne moved to Norwich, where he practised medicine and pursued his literary studies till his death. On 10 July 1637, he was incorporated Doctor of Physic at Oxford. He married, 1641, Dorothy, fourth daughter of Edward Mileham, of Burlingham St. Peter. She bore him 12 children, and survived him three years. Throughout the civil wars he remained at heart a Royalist, and ever regretted what he called "the horrid murder of King Charles I." But his calm spirit "quietly rested under the drums and trappings" of the revolution, and he took no active part in the upheaval of the times.

Browne's reputation for learning and research was greatly increased in 1646 by the publication of his elaborate work, "Pseudodoxia Epidemica; or, Enquiries into very many received tenets and commonly presumed truths, which examined prove but Vulgar and Common Errors." This treatise is encyclopedic in scope, and must have grown to its final extent through many years of slow accretion. It was soon translated into Dutch, German, and French; and attracted no little attention among scholars by the vast and recondite learning it displayed. Browne's advice and assistance soon became sought by scholars engaged in scientific and antiquarian pursuits. Among the best known men of the time who sought his acquaintance was John Evelyn, with whom in 1658 he began a correspondence which lasted through his life. In October 1671, Evelyn journeyed to Norwich to visit Browne; and wrote, in his diary, an account of Browne's surroundings. The house and garden were "a paradise and cabinet of rarities, and that of the best collections, especially medals, books, plants, and natural things." Evelyn noticed particularly Browne's extensive collection of birds' eggs.

In 1658 Browne composed the solemn 'Hydriotaphia, Urn-Burial; or, A Discourse of the Sepulchral Urns lately Found in Norfolk.' At the same time he published the most fantastic of his writings, 'The Garden of Cyrus; or, The Quincuncial, Lozenge, or Network Plantations of the Ancients, Artificially, Naturally, Mystically Considered.' In December 1664, he was created socius honorarius of the College of Physicians, and received the diploma of the institution on 6 July 1665. On 28 Sept. 1671, he was knighted by Charles II., on the occasion of a royal visit to Norwich. Although Browne's literary activity continued unabated until his death, he published nothing after 1658. He died on his 77th birthday, and was buried in the church of St. Peter Mancroft, Norwich. In 1840, some workmen who were making a new grave accidentally fractured the lid of Browne's coffin with a pickaxe. The skeleton was thus

exposed, and the sexton took possession of the skull. It is now on exhibition in the Norfolk and Norwich Hospital.

Many of Browne's manuscript writings were published posthumously. In 1684 his friend Archbishop Tenison brought out a collection of 'Miscellany Tracts' on subjects ranging from the ancient monuments of Norwich to the plants mentioned in the Bible and the fishes eaten by our Saviour with his disciples after his resurrection from the dead. In 1690 his son, Dr. Edward Browne, published his beautiful 'Letter to a Friend, upon occasion of the death of his intimate friend,' which forms a sort of prelude to the careful dissertation on 'Christian Morals'—intended perhaps as a continuation of the 'Religio Medici'—which was first published in 1716 by Archdeacon Jeffrey. A collection of the 'Posthumous Works of the learned Sir Thomas Browne, Knt., M.D., late of Norwich,' was published by an unknown editor in 1712. It contains, among other tracts, a striking fragment of an essay on 'Dreams.'

Browne belongs to the class of mystical soliloquists who love to discourse to themselves about fantastic subtleties too fine to excite the curiosity of vulgar minds, but who yet are not too self-engrossed to allow the friendly reader to overhear their musings. He loves to "turn the world round" not only for his own, but also for his reader's "recreation," and to lead the reader with him through a labyrinth of fancy until both "lose themselves in a mystery." His works are lacking in design, uneven, whimsical, and capricious; but they reveal a personality serene, altruistic, tolerant, mystical, reverent, and friendly. Furthermore, he commands a style that for lordly eloquence and orchestral harmony remains unrivaled in the entire history of English prose.

Browne's greatest work is the 'Religio Medici.' In this treatise, which combines the meditations of many leisure hours, he has revealed all of the emotional affluence of his soul. It is a mystical acceptance of the creed of the Anglican Church, leavened with a touching tolerance of other beliefs. Paradoxically it combines an imaginative scepticism with a naive credulity. Browne believed in witches, for example; and refused to accept the Copernican system of astronomy because it contradicted the literal statements of the Hebrew Scriptures. But there is no narrowness in Browne's most characteristic mood. He rises on the wings of exaltation until he soars into the presence of Infinitude and glows with a religious ecstasy known of all nations and of all times.

The 'Pseudodoxia' is a less worthy work. It is a vast chaos of recondite lore, bewildering by the very extent of its voluminous observation. It opens with an inquiry into the sources of error not a little resembling Bacon's famous arraignment of "Idols"; But Browne had no true sense of natural law, as Bacon understood it, and often fallacies pursue him in his pursuit of fallacy.

'The Garden of Cyrus' is a fanciful dissertation on the quincunx, that geometrical arrangement of five points familiar in the five of a domino. As Coleridge said, Browne finds "quincunxes in heaven above, quincunxes in

earth below, quincunxes in the mind of man, quincunxes in tones, in optic nerves, in roots of trees, in leaves, in everything."

The grandeur of Browne's style is displayed most fully in 'Hydriotaphia.' Some Roman sepulchral urns accidentally unearthed in Norfolk furnished him with the suggestion for this eloquent monody, which, beginning with an historical discussion of ancient modes of burial, soon develops into a solemn homily on death and the vicissitudes of worldly fame. The style shows an eloquent spontaneity rather than a conscious mastery of art. It would not be a serviceable model for a modern writer; it is hyper-latinised and capricious; but it is incomparable for pompous rhythm and resonant harmony.

Bibliography.—The standard edition of Browne's works is that edited by Simon Wilkin (4 vols. 1835-6) which has been called the best edited book in the language; it contains a life by Dr. Johnson. The posthumous works (ed. 1712) contain also a life and Whitefoot's minutes. Consult: S. T. Coleridge, 'Literary Remains'; Edward Dowden, 'Puritan and Anglican Studies'; Edmund Gosse, 'Sir Thomas Browne'; W. A. Greenhill, introductions (to separate vols. of Browne) 'Golden Treasury Series'; Walter Pater, 'Appreciations'; Sir Leslie Stephen, 'Hours in a Library' (vol. I); J. A. Symonds, introduction, 'Camelot Series.'

CLAYTON HAMILTON,

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Browne, Thomas Alexander (ROLF BOLDREWOOD), Australian romancer: b. London, England, 6 Aug. 1826. He is a son of Capt. Sylvester Browne, a founder of Melbourne, Australia. He was educated in Sidney College, and has written 'Ups and Downs: a Story of Australian Life' (1879); 'Robbery Under Arms: Life and Adventures in the Bush' (1888); 'A Squatter's Dream Story' (1890); 'The Miner's Right' (1890); 'A Colonial Reformer' (1890); 'A Sydney Side Saxon' (1891); 'A Modern Buccaneer' (1894); 'The Crooked Stick' (1895); 'The Sphinx of Eaglehawk' (1895); 'The Sealskin Cloak' (1896); 'My Run Home' (1897); 'Plain Living' (1898); 'A Canvas Town Romance' (1898); 'The Babes in the Bush' (1900); 'In Bad Company' (1901); 'Ghost Camp' (1902).

Browne, Ulysses Maximilian (COUNT VON), Austrian military officer: b. Basel, 23 Oct. 1705, of an Irish Jacobite family; d. 26 June 1757. He entered the Austrian service at the age of 12, and became one of the foremost field marshals in the army of Maria Theresa. As governor of Silesia (1739-42), he had to face the first of Frederick the Great's attacks, and in the Seven Years' War he commanded the Austrians at Lobositz (1756). He was mortally wounded at the battle of Prague.

Browne, William, English poet: b. Tavistock, Devonshire, 1591; d. Ottery Saint Mary, Devonshire, about 1643. He was educated at Oxford, and spent a quiet, tranquil life. His poetry is graceful and fanciful, and abounds in beautiful pictures of English scenery. Browne has always been much admired by the poets.

His chief work is 'Britannia's Pastorals' (1613-16). 'The Shepherd's Pipe' (1614) is a collection of eclogues, and 'The Inner Temple Masque' (1614-15) tells the story of Ulysses and Circe. His minor poems are very fine. The best modern editions are by Hazlitt for the Roxburghe Club, and by Gordon Goodwin, 'The Muse's Library.'

Browne, William George, English traveler: b. London, 25 July 1768; d. northern Persia, 1813. In several expeditions he traveled through Egypt and some parts of the interior of Africa, and through Asia Minor and Armenia. In 1812 he proposed a more extensive journey through central Asia. He had already, in 1813, arrived at Tabreez, on his way to Tartary, when his party was attacked by banditti and himself murdered. He was the author of 'Travels' in Africa, Egypt and Syria (1800).

Browne, William Hand, American author: b. Baltimore, 31 Dec. 1828. He studied medicine and graduated M.D. at the University of Maryland, but soon turned his attention to English literature, in certain departments of which he came to be an authority. He edited the 'Southern Review' (1867-8), and the 'Southern Magazine' (1870-5); he was librarian at Johns Hopkins University from 1879 to 1891, when he became professor of English literature. He has translated F. Spielhagen's 'Hammer and Anvil' (1870); Turgenieff's 'Spring Floods' (1874); and Falke's 'Greece and Rome' (1882). In collaboration with R. M. Johnston he wrote 'Historical Sketch of English Literature' (1872); and a 'Life of Alexander H. Stephens' (1878); with J. T. Scharf, 'History of Maryland' (1878); and with S. S. Haldeman he compiled 'Clarendon Dictionary: Concise Hand-Book of the English Language' (1882). He has also written 'George Calvert and Cecilius Calvert, Barons Baltimore'; 'Maryland: the History of a Palatinate' (1884); and has edited 'Archives of Maryland: Proceedings and Acts of the General Assembly, 1637-44' (1883); and 'Selections from the Early Scottish Poets.'

Browne, William Hardcastle, American lawyer and author: b. Philadelphia, 14 Nov. 1840. In 1865 he was admitted to the Philadelphia bar, where he has since practised, but he is best known for his legal and literary compilations, chief of which are: 'Digest of the Law of Divorce and Alimony in the United States' (1890); abridged editions of Blackstone's 'Commentaries' (1894); and Kent's 'Commentaries' (1895); 'Law of Negligence in Pennsylvania' (1896); 'Law on Decedents' Estates in Pennsylvania' (1897); 'Witty Sayings by Witty People' (1898); 'Odd Derivations of Words and Phrases' (1900); 'Waverley Novels', abridged (6 vols. 1901), and others.

Brownell, Clarence Ludlow, American journalist and author: b. Hartford, Conn., 6 June 1864. He studied at Harvard University and Stevens Institute of Technology, and for five years was English instructor in government and private schools in Japan. For some years he has been a constant contributor of articles on Japanese life, etc., to American magazines and newspapers, and is steadily at work on a history of Japan and Buddhism in that country. He has written: 'Tales from Tokio' (1900).

BROWNELL—BROWNING

Brownell, Franklin P., Canadian artist: b. New Bedford, Mass. He makes specialties of portraits and figure-painting. For some years he has been principal of the Ottawa Art School. His canvas, 'The Photographer,' is in the National Gallery at Ottawa.

Brownell, George Griffin, American educator: b. Fairfield, N. Y., 2 July 1868. He graduated at Syracuse University, 1893, and studied at the Sorbonne, Paris, 1893-4, and at Johns Hopkins University, 1894-8, when he was appointed professor of Romance languages at the University of Alabama. He wrote for *Harper's Weekly* 'The Lone Star Republic' (1894), and 'The Vale of Andorra' (1895); he has edited for college use the Spanish texts 'El Capitán Veneno' (1901), and 'El Pájaro Verde' (1901); and has contributed frequently to 'Modern Language Notes' on subjects relating to the Romance languages and literatures.

Brownell, Henry Howard, American poet and historian: b. Providence, R. I., 6 Feb. 1820; d. East Hartford, Conn., 31 Oct. 1872. His first essay in poetry was a spirited versification of Farragut's 'General Orders' to the fleet below New Orleans. Afterward he was appointed to an honorary place on the Hartford, flagship, and had opportunity to observe actual naval warfare. In 'The Bay Fight' he describes, with truth and force, the battle of Mobile Bay. He collected and published his many occasional verses in 'Lyrics of a Day; or, Newspaper Poetry by a Volunteer in the United States Service' (1864).

Brownell, Thomas Church, American Protestant Episcopal bishop: b. Westport, Mass., 19 Oct. 1779; d. Hartford, Conn., 13 Jan. 1865. He was graduated from Union College, Schenectady, N. Y., in 1804. The next year he accepted the post of tutor in Latin and Greek in that institution; in 1807 was appointed to the chair of belles-lettres and moral philosophy; and in 1809 was chosen the first professor of chemistry and mineralogy. He entered the Episcopal ministry in 1816, and in connection with his professional duties gave himself to the work of a missionary in Schenectady. In 1818 he became an assistant minister in Trinity Church, New York. He was consecrated Bishop of Connecticut, 27 Oct. 1819, and removed at once to his new field of labor. During his long episcopate of 45 years, Bishop Brownell was actively and efficiently engaged in the duties of his station. Washington (now Trinity) College, at Hartford, Conn., took its rise under his auspices in 1824; and he became its first president, resigning in 1831. In 1852 he became presiding bishop in the American Episcopal Church. He published 'The Family Prayer Book' (1823); 'Religion of the Heart and Life' (1839-40); 'Consolation for the Afflicted'; 'The Christian's Walk and Conversation'; etc. A bronze statue of Bishop Brownell has been placed on the campus of Trinity College.

Brownell, William Cray, American essayist and critic: b. New York, 30 Aug. 1851. Having graduated from Amherst, he devoted himself to critical and editorial work in New York city. He became an editor of 'Scribner's Magazine', and among his writings are: 'French Traits: an Essay on Comparative Criticism' (1880); 'French Art' (1892); 'Newport' (1896); and other works.

Brownie, a spirit of goblin, in old popular superstitions of Scotland, supposed to haunt old houses, especially those attached to farms. He might be called the Robin Goodfellow of Scotland. In the night he helped the family, and particularly the servants, by doing many pieces of drudgery, performing domestic labors while the inmates of the household slept. If offered food or any other recompense for his services, he decamped and was seen no more.

Browning, Elizabeth Barrett, English poet: b. Durham, 6 March 1806; d. Florence, Italy, 29 June 1861. Her father, Edward Moulton, or Moulton-Barrett, as soon after her birth he began to write his name, was a country gentleman who resided at the foot of the Malvern Hills, and in this beautiful retreat Elizabeth's girlhood was passed. She early began to commit her thoughts to writing, and in 1826 appeared her volume entitled 'An Essay on Mind and Other Poems,' anonymously published. Viewed as the production of a young lady of 20, this book is indeed a remarkable one; but in after years its author was so dissatisfied with it that she omitted it in the collected editions of her poems. In 1833 appeared a translation by her of the 'Prometheus Bound,' of Æschylus. A collection entitled 'The Seraphim and Other Poems' was produced in 1838, the principal piece being a lyric drama shadowing forth the feelings and emotions which may be supposed to have been excited in an angelic being by the spectacle of the crucifixion. Both in this and in a subsequent work, 'The Drama of Exile' (1840), she chose for her theme the fall and redemption of man, subjects on which Milton had already employed his genius, and in the treatment of which, though exhibiting much grandeur and sublimity, Mrs. Browning can scarcely be said to have approached him. Always feeble in health, she was now nearly brought to the verge of the grave by the rupture of a blood vessel, and having been taken to Devonshire to promote her recovery, received there a severe shock from the drowning of a favorite brother. For several years she was confined to a darkened chamber, and saw only a few of her most intimate friends, but nevertheless continued to busy herself with study and composition. Her health was at length partially restored, and in 1846 she was married to Mr. Robert Browning, a gentleman already well known in the literary world as a poet and dramatist. After their union they went to Italy, and continued subsequently to reside for the most part in Florence. In 1850 a collected edition of Mrs. Browning's works appeared in two volumes, including several new poems, and among others 'Lady Geraldine's Courtship,' one of the finest of her productions, and remarkable, it is said, as having been composed in the incredibly short space of 12 hours. Her 'Sonnets from the Portuguese,' included in this volume, were written after her engagement, and first privately printed. They have no parallel for excellence in their peculiar kind in our literature. 'Casa Guidi Windows,' a poem on the struggles of the Italians for liberty in 1848-9, appeared in 1851. The longest and most finished of all her works, 'Aurora Leigh,' a romantic narrative and didactic poem in blank verse, was published in 1856. Her last volume, 'Poems Before Congress,' appeared in 1860, and cannot be said to have added greatly to her reputation.

BROWNING

Several detached pieces of hers appeared from time to time in the 'Cornhill Magazine,' up to the period of her death. 'Last Poems,' by Mrs. Browning, published by Robert Browning in 1862, and 'Greek Christian Poets and the English Poets,' translations and essays of hers published by Mr. Browning in 1863, were followed in 1866 by his publication of 'Selections from the Poems of Elizabeth Barrett Browning' (2d series 1880). The 'Letters of E. B. Browning,' edited by Frederick G. Kenyon (1897), are a definitive presentation of her character and career in a selection from a very large mass of correspondence collected by Mr. Browning himself. It is a chronicle, and practically a life, by reason of the character of the letters and the addition of connecting links of narrative. The letters give an unusually full and interesting revelation of the course of her life. The poetry of Mrs. Browning is characterized by much pathos and depth of feeling, combined with great vividness and powers of description. It partakes eminently of the modern English school, as represented by Tennyson and others, at times obscure and transcendental, but animated throughout by the most noble and exalted sentiments, and illuminated from time to time by flashes which, in their bearings on the unseen world of mind and spirit, seem almost supernatural. In their married life she and Robert Browning found mutual happiness and help, the good influences of which are reciprocally manifested in their writings.

Browning, Orville Hickman, American politician: b. Harrison County, Ky., 1810; d. Quincy, Ill., 10 Aug. 1881. While performing the duties of clerk in the office of the county and circuit clerk of Bracken County, he pursued a course of classical studies at Augusta College. Admitted to the bar in 1831, he settled in practice at Quincy, Ill., where he subsequently resided. In 1832 he served through the Black Hawk war, and was a member of the Illinois legislature, 1836-43. In conjunction with Abraham Lincoln he organized the Republican party in Illinois at the Bloomington convention. When the Civil War broke out he warmly supported the government, and in 1861 was appointed to the United States Senate to fill the vacancy caused by the resignation of Stephen A. Douglas. President Johnson made him secretary of the interior in 1866, and for one year from March 1868 he also acted as attorney-general. In 1869 he was elected to the State Constitutional Convention, and after that he retired to the practice of his profession.

Browning, Oscar, English author: b. London, 17 Jan. 1837. He was educated at Eton and at King's College, Cambridge, where he was graduated with classical honors in 1860. From 1860 to 1875 he was a master at Eton, and since 1876 has been lecturer in history and political science at Cambridge. He has also served as principal of the University Training College for teachers, and in other educational capacities. Twice he has been an unsuccessful candidate of the Liberal party for Parliament. He is a voluminous writer on subjects of education, history, biography, etc., and among his works are: 'Cornelius Nepos' (1868); 'Netherlands in the 16th Century' (1869); 'Thirty Years' War' (1870); 'Modern England' (1879); 'Modern France' (1880); 'History of Educational

Theories' (1881); 'History of England' (1890); 'Life of George Eliot' (1890); 'Goethe: Life and Works' (1891); 'The Citizen: His Rights and Responsibilities' (1893); 'Life of Peter the Great' (1898); 'Wars of the 19th Century' (1899); 'History of Europe, 1814-43' (1901); 'Letters from India' (1902).

Browning, Robert, English poet: b. Camberwell, a suburb of London, 7 May 1812; d. Venice, 12 Dec. 1889. His father, Robert, who was a clerk in the Bank of England, and was himself a lover of books, a classical scholar and ready at versifying, had the boy educated in a school at Peckham, after which he attended lectures at University College. His father's family being dissenters, his mind was trained and his character formed under influences less peculiarly English than those to which youths are exposed in the great public schools and the two leading universities of that country. At the age of 20 he traveled on the Continent and resided for some time in Italy, where he made diligent study of the mediæval history of that country, so fruitful in themes for poetry such as his genius was to produce. In 1833 he published anonymously his first book, 'Pauline'; spent some months in Russia, in 1834; and in the following year issued 'Paracelsus,' a dramatic poem in five parts. In 1837, at the suggestion of Macready, he wrote the tragedy of 'Strafford,' which was produced at Covent Garden in May of the same year, with no marked success. His next poem, 'Sordello,' was printed in 1840, and the obscurity of its introspective subtleties injured the poet's reputation with the critics. Notwithstanding this, he published (1841-6) the 'Bells and Pomegranates' series, in which were included the three plays, 'Pippa Passes,' 'King Victor and King Charles,' and 'Colombe's Birthday'; the four tragedies, 'The Return of the Druses,' 'A Blot in the 'Scutcheon' (produced by Macready at Drury Lane in 1843), 'Luria,' and 'A Soul's Tragedy'; while among the lyrics were 'The Pied Piper of Hamelin,' 'How They Brought the Good News from Ghent to Aix,' and 'The Lost Leader.' In 1846 he married Elizabeth Barrett (q.v.), and settled with her in Florence, where they remained for nearly 15 years. During his residence there he published 'Christmas Eve and Easter Day' (1850), and 'Men and Women' (1855), the latter containing such characteristic poems as 'Andrea del Sarto,' 'Fra Lippo,' 'Childe Roland,' 'Evelyn Hope,' 'One Word More,' and 'Up at a Villa.' When the poet's wife died in 1861 he returned to London, and entered upon his richest literary period by publishing 'Dramatis Personæ' (1864). These dramatic monologues, of which there were 17, include 'Rabbi Ben Ezra,' 'Abt Vogler,' 'Prospice,' 'Caliban upon Setebos,' and 'A Death in the Desert.' Recognition of his literary fame, which came slowly, was made in 1867, when he was elected an honorary Fellow of Balliol, an M.A. of Oxford, and later an LL.D. of Cambridge. It was not, however, until 1869, that 'The Ring and the Book' was published, and this poem, which accentuates every characteristic of the poet, still remains his central achievement. The poem, which is epic in length if not in method, is the story of a murder told 10 times over in wide variety of intention by various persons connected with the tragedy. His next publication was the short poem of 'Hervé Riel,' the pro-

BROWNIISM — BROWNSON

ceeds from which were devoted to the relief of Paris after the siege in 1871. Following this came 'Balaustion's Adventure' (1871), including a translation of Euripides' 'Alcestis'; 'Prince Hohenstiel-Schwangau, Saviour of Society' (1871), an imaginary conception of how Louis Napoleon might justify his policy; 'Fifine at the Fair' (1872), in which the relations of the sexes are discussed; 'Red-Cotton Night-Cap Country' (1873), a story of love, penitence, and suicide, the scene of which is laid in Normandy; 'Aristophanes' Apology' (1875); 'The Inn Album' (1875), a story of a woman's wrongs; 'Pacchiarotto and Other Poems' (1876), in which 'Pacchiarotto, and How He Worked in Distemper' conveys an implication of Browning's own method in the poetic art; 'The Agamemnon of Æschylus' (1877); and 'La Saisiaz' (1878), in which immortality is discussed. As a kind of new departure he published a first set of 'Dramatic Idylls' (1879), and a second series (1880), of which the more important are 'Martin Relph,' 'Pheidippides,' and 'Ivan Ivanovitch.' The volumes which have followed are 'Jocoseria' (1883); 'Ferishtah's Fancies' (1884); 'Parleyings with Certain People of Importance in Their Day' (1887), and 'Asolando' (1889). The latter volume was published when the author was on his death-bed, and an account of its favorable reception was almost the last information he received. His body was brought from Venice to England, where, in national recognition of his genius, it was buried in Westminster Abbey between Cowley and Chaucer. In such fashion, and in ungrudging completeness, was his poetic greatness acknowledged at the last. Its too tardy recognition by the popular voice was largely due to the prevailing belief that poetry is for the mental dalliance of a lazy hour, and also to the persistency with which Browning had mocked at this belief in the athletic hardness of mind which he required in his readers. Moreover he seemed always inclined, to the dismay of the public, to press forward into service the superficial defects of his solid interior qualities. Thus, at times, his wide scholarship strayed off into pedantry; his secure skill in verse dropped ever and again into grotesque Bohemian robustness of phrase and rhyme; his swift intuitive glance into the problems of life seemed to create in him an artistic impatience of detail which, in the structure of his verse, became a thrifty brusqueness of expression tending toward cipher; and, above all, his most notable gift of analysis, his power to track the most hidden motive to its last retreat, seemed ever tending to lapse into an introspective subtlety akin to the cobwebberies of the schoolmen. Yet, aside from these occasional shortcomings, there remain his learning, his humor, his mastery of artistic expression, his immense range of sympathy, his spiritual insight, and the height and strength of his ideals to make him one of the greatest of modern poets.

Brownism. See BROWN, ROBERT.

Brownists, a name given during the latter part of the 16th century to those who were afterward known in England and Holland under the denomination of Independents, called Brownists from Robert Brown (q.v.). See also INDEPENDENTS.

Brownlee, William Craig, American clergyman: b. Torfoot, Lanarkshire, Scotland, 1784; d. New York, 10 Feb. 1860. His paternal ancestors for many generations were the 'Lairds of Torfoot.' He graduated M.A., at the University of Glasgow, was licensed to preach, and came to America in 1808. For a time he taught Latin and Greek in Rutgers College, but in 1826 was installed as one of the ministers of the Collegiate Reformed Dutch Church in New York city. He was a vigorous controversialist, earnestly opposing the Quakers and Roman Catholics. His writings include: 'Inquiry into the Principles of the Quakers' (1824); 'The Roman Catholic Controversy' (1834); 'Treatise on Popery' (1847); 'Lights and Shadows of Christian Life' (1847); 'Deity of Christ'; 'History of the Western Apostolic Church'; and some minor religious tracts and pamphlets.

Brownlow, William Gannaway, American clergyman, journalist, and politician: b. Wythe County, Va., 29 Aug. 1805; d. Knoxville, Tenn., 29 April 1877. Early left an orphan and penniless, he earned enough as a carpenter to give himself a fair education, and in 1826 became an itinerant Methodist preacher. He began his career as a political agitator in 1828 by advocating in Tennessee the re-election of President John Quincy Adams, and in Calhoun's own district in South Carolina he publicly opposed nullification. From 1838 until its suppression by the Confederates in 1861, he published and edited at Knoxville a paper called *The Whig*, his fiery editorials causing him to become known as "the fighting parson." He upheld slavery but opposed secession, a course which subjected him to much persecution. He refused to take the Confederate oath of allegiance, and in consequence was imprisoned on a charge of treason, but finally released and sent into the Union lines, 3 March 1862. On the reconstruction of Tennessee in 1865 he was elected governor and served two terms. He advocated the removal of the negroes to a separate territory and opposed giving them the ballot. In 1869 he was elected to the United States Senate and served until 1875, during which time he was a member of the committees on pensions and revolutionary claims. He wrote: 'The Great Iron Wheel Examined' (1858), a defense of Methodism; 'Sketches of the Rise, Progress, and Decline of Secession: With a Narrative of Personal Adventures Among the Rebels' (1862); and, with Prynne, 'Ought American Slavery to be Perpetuated? A Debate at Philadelphia, September 1858,' in which Brownlow took the affirmative side (1858).

Brownson, Henry Francis, American lawyer and author: b. Canton, Mass., 7 Aug. 1835. He graduated at Holy Cross College, Worcester, Mass., and was admitted to the bar September 1856, after having studied for some years in Paris and Munich. From June 1861 to January 1871 he served in the United States army, chiefly in the artillery, and attained the rank of brevet-major. He wrote various articles for 'Brownson's Quarterly Review' (1853-61), but has chiefly devoted himself to editing the works of his father, Orestes A. Brownson; namely, 'Works of O. A. Brownson' (1883-7); 'Literary, Scientific, and Political Views of O. A. Brownson' (1893). He has also written 'Religion of Ancient Craft Masonry' (1890);

BROWNSON — BROWNWOOD

'Faith and Science' (1895); 'Equality and Democracy' (1897); 'Early, Middle, and Latter Life of O. A. Brownson' (1898-1900).

Brownson, Orestes A., American publicist: b. Stockbridge, Vt., 1803; d. 1876. His writings embrace philosophical, political, sociological and theological subjects. As a child he displayed deep religious feeling and a keen intellectual interest in all theological questions. He was brought up without any strictly defined creed, but at the age of 19 formally joined the Presbyterian Church. This move was the beginning of a long series of religious variations, which terminated in his reception into the Catholic Church in 1843. Soon becoming dissatisfied with Presbyterianism he sought refuge in Universalism, abandoning, as he himself says, Supernaturalism for Rationalism. After leaving Presbyterianism, in 1825, he applied for and received a letter of fellowship as a preacher from the General Convention of Universalists. It was shortly after this that he fell in with the socialistic theories of Robert Owen, who had come to this country to establish his communistic colony at New Harmony, Indiana. Under the influence of Owen's ideas, Brownson cooperated in founding and establishing the Workingman's Party to advance Socialism in the sphere of practical politics. Through Owen Dr. Brownson also came in contact with Frances Wright, who lectured throughout the United States in the interest of the Socialist propaganda. But Brownson's enthusiasm in the political side of the question was short-lived and he soon abandoned the political movement, and returned to his pulpit, but as an independent preacher, responsible to no church, sect or denomination. In 1832 he came under the influence of Dr. Channing, to whom he pays a grateful but discriminating tribute in his work 'The Convert,' written after his conversion to the Catholic Church. In 1836 he went to Boston to preach to the laboring classes, and becoming convinced of "the necessity of a new religious organization of mankind," established for that purpose "The Society for Christian Union Progress," whose object was the union and progress of mankind on broad humanitarian lines. The "new doctrine" inculcated and preached during this period by Dr. Brownson was a mixture, in part drawn from the Eclecticism of Cousin and from the Communism of the Saint-Simonians, a philosophico-religious sect then recently sprung up in France. Brownson's attitude was at this time ultra-radical; he utterly denied the Church and the Priesthood in the religious order, and the distinction of classes in the social order, and would have made all government but the instrument to level men and their institutions to the lowest terms of the socialistic idea. But by 1840 he began to retrace his steps, and after much study and reflection, and after having read for the first time, as he himself tells us in 'The Convert,' Aristotle on Politics, "came to see that the condition of liberty is order, and that in this world we must seek not equality, but justice." Up to this point in his career Dr. Brownson had followed negative lines in his religious and intellectual life from a belief in a supernatural Christianity, as represented by Presbyterianism, to the broadest Socialism which denied the supernatural life of man altogether. He

now began an advance forward to a positive and supernatural conception of the world. "I had now settled in my mind," he says, "that the progress of man and society is effected only by supernatural assistance, and that this assistance is rendered by Almighty God, in perfect accordance with nature and reason, through providential men." With this conception as his premise, after some four years of struggle and study, he arrived at the conclusion that he must logically accept the Catholic Church as the divinely established institution for the supernatural guidance and direction of mankind. After receiving instruction from Bishop Fitzpatrick, of Boston, Dr. Brownson was baptized a Catholic in 1844, and died in the Catholic communion. After his entrance into the Catholic Church he became its ardent and vigorous champion, though sometimes in the advocacy of his views he came into conflict with ecclesiastical authority. He was a vigorous and trenchant writer, bold and uncompromising in his views, when he believed them logical, and often in controversy unsparing in his method against an adversary. His temperament was polemical and fearless, his interest keen, and his advocacy enthusiastic of whatever cause he might be pleading. He was a sincere lover of truth and unflinching in pursuing his conclusions. He was perhaps the greatest publicist whom America has produced. His writings are voluminous, covering a vast variety of subjects, and have been published in 20 volumes (1882-87) by his son, Henry F. Brownson. A 'Life' in 3 volumes by the latter appeared in 1900.

CONDÉ B. PALLEN,

Editorial Staff, 'Encyclopedia Americana.'

Brownstone, the reddish-brown sandstone of the Triassic Age, so named originally in the Eastern United States, where it occurs in New Jersey and Connecticut. The name is now generally used for any brown sandstone adapted for building purposes, but the most important stones included under this name are those just mentioned, which are quarried at Portland and Middletown, Conn., and the Cambrian or Pre-Cambrian sandstones that are worked near Marquette, Mich. The use of brownstone has greatly diminished in recent years, granite and limestone having largely superseded it in public favor.

Brownsville, Texas, a city, port of entry, and county-seat of Cameron County, situated on the Rio Grande River, and the Rio G. R.R., opposite Matamoras, Mexico. It contains the cathedral of the Immaculate Conception, the Convent and Academy of the Incarnate Word, a United States government building, and a national bank, and has a large trade with Mexico. In the suburbs is Fort Brown, a garrisoned United States post. In May 1846 Brownsville was occupied and fortified by a small body of United States troops, who maintained their position in the face of a heavy bombardment that lasted for 160 hours, and in November 1863 it was taken from the Confederates by a Federal army under Gen. Banks. Pop. (1910) 10,517.

Brownwood, Texas, a city and county-seat of Brown County, situated on the Gulf, C. & S. F., and the Fort Worth & R. G. R.R.'s, 140 miles northwest from Austin. It was settled in 1866 and incorporated in 1878. It trades in wheat, hay, cotton, cattle, hides, and pecan nuts.

There are flour mills, cottonseed-oil mills, and manufactories of wire-fencing, saddle and harness, ice, etc. Here are located the Daniel Baker College, under Presbyterian auspices, and the Howard Payne College, controlled by the Baptists. The city owes its waterworks. Pop. (1910) 6,967.

Brozik, Vaczlav, Bohemian artist: b. near Pilsen, 1852; d. 1901. He was a pupil at the Prague Academy, and also of Piloty. Most of his subjects were taken from the history of Bohemia, and as a historical painter he won high rank. Among his works may be mentioned the 'Embassy of Ladislav of Bohemia to Charles VII. of France'; 'The Execution on the White Mountain'; 'The Ballad Singer'; and 'The Imperial Councilors Thrown Out of the Window at Prague.' His 'Columbus at the Court of Ferdinand and Isabella' is in the Metropolitan Museum, New York.

Bruce, a noble family of Scotland, two members of which occupied the throne after one had pretended to it in vain. Distinguished members were:

1. **ROBERT**, seventh lord of Annandale: b. 1210; d. 1 April 1295. He was one of the 13 claimants of the crown in 1290, when, by the demise of Margaret, the "maiden of Norway," the posterity of the last three kings of Scotland had become extinct, and the succession reverted to the posterity of David, Earl of Huntingdon, and younger brother of King William, the Lion. The question of succession speedily resolved itself into a simple alternative between two competitors, John Baliol, the great-grandson of David by his eldest daughter, Margaret, and Robert Bruce, the grandson of David by his second daughter, Isabel. The contest was, by mutual consent, referred for decision to King Edward I. of England, who pronounced, in accordance with principles that would not now be disputed, that "in all indivisible heritages the more remote in degree of the first line of descent is preferable to the nearer in degree of the second," and thus gave the kingdom to Baliol, from whom he required homage and fealty. Bruce now retired to England, took service in the English army, and fought against Baliol in the war which resulted in the subjugation of Scotland to England. He returned to his English estates soon after the resignation of Baliol, and died about 1296.

2. **ROBERT**, son of the preceding, Earl of Carrick and Annandale: d. 1304. He constantly followed the fortunes of Edward, and fought bravely against Wallace and the patriot party of Scotland. After having assisted in defeating Wallace at Falkirk, he is said to have slackened his zeal for England, but did so little for the national cause that he was able to make his peace with Edward, when, a little later, after the capitulation at Irvine, Wallace was driven with his adherents into the northern mountains.

3. **ROBERT**, son of the preceding, Earl of Carrick, and afterward king of Scotland: b. 21 March 1274; d. 9 July 1329. He acted at first as Edward's liegeman, but vacillated between the two parties, taking no very active part in the struggle between Wallace and England, but inclining to the national cause when a gleam of success enlivened the hopes of the patriots, and, at the approach of Edward, making his peace with the conqueror. He was one of those con-

sulted by the king in the settlement of Scotland as an English province, and was permitted to retain the extensive lands of his ancestors unalienated. In 1306, Comyn, the son of Baliol's sister, a nobleman distinguished by his efforts to recover the independence of his country, arrived in Dumfries about the same time with Bruce. By appointment he met Bruce alone in the church of the Minorites, who there stabbed him with his dagger; whether by premeditated treachery or in a sudden fit of passion cannot now be ascertained. Bruce now assumed the title of king, summoned the Scots to his standard, and was crowned, without any opposition, at Scone. Edward immediately sent Aymar de Valence, Earl of Pembroke, with a great army to chastise the rebels. The force of Bruce was almost immediately destroyed, six of his best knights made prisoners, and he himself, thrown from his horse, was rescued only by the devotion of Seaton. For two months, with his brothers and the ladies of his household, he wandered to and fro in the Grampian Hills, till his party being discovered, defeated, and forced to separate, he buried himself for concealment in the island of Rathlin, on the north of Ireland. His three brothers, and others, were captured; and the brothers were soon after hanged at Carlisle. In the spring of 1307 Bruce returned from his retreat, surprised his own castle of Carrick, defeated small parties of English in many skirmishes, and was enabled to maintain himself among the hills and forests until Edward called out an army and marched toward the borders, but died on his way, leaving to his son a charge not to bury his bones till he had borne them in triumph from Berwick bounds to the utmost highlands. For three years Edward II. paid no attention to his father's advice or the Scottish war, but in the autumn of 1310 he marched into Scotland as far as the Forth without encountering an enemy, for Bruce wisely declined to give him battle. In the next year he sent his favorite Gaveston to renew the war, who penetrated beyond the Forth, but still gained no advantage, Bruce constantly retreating before him, keeping the hills, where he could not be assailed, and harassing the English by constant petty skirmishes in which he mostly worsted them. The following years were passed by Edward in ignoble contentions with his Parliament, and by Bruce in gradually but surely recovering all that he had lost in Scotland, until, in 1314, the strong hill fortress of Stirling alone held out for the English, and even that the governor, Mowbray, had been forced to consent to surrender if it should not be relieved before the feast of St. John the Baptist. This at length aroused Edward, who, at the head of a large army, encamped in the neighborhood of the beleaguered fortress, and was there met by Bruce at the head of 30,000 picked men, on the eve of the festival fixed for its surrender. The battle of Bannockburn, which succeeded, was the bloodiest defeat which the English ever suffered at the hands of their Scottish neighbors. It fixed the crown securely on the head of Bruce, and at once enabled him to exchange his prisoners, who were of the highest rank in England, against his wife, his sister, and his other relatives, who had long languished in captivity. After this success the Scottish people assumed the offensive and invaded Ireland, where they at first gained considerable successes, and of which island Edward

BRUCE—BRUCHESI

Bruce was crowned king. While the dissensions lasted between Edward II. and his barons, Robert Bruce repeatedly devastated the borders and all the north of Yorkshire, even to the walls of York, into which he on one occasion chased the English king in disgrace, narrowly failing to make him prisoner. In 1323 this bloody war, which had raged, with few pauses, for 23 years, was brought to a close by a truce concluded between the two kingdoms for 13 years, to remain in force even in the event of the death of one or both of the contracting parties. Four years after this Edward II. was compelled to abdicate in favor of his son, Edward III., and Bruce, seeing his occasion in the distracted state of England, renewed the war, with the avowed intention of forcing Edward to renounce his claim of sovereignty over the crown of Scotland. In 1328 this renunciation was made; Scotland was declared sovereign and independent; Jane of England, the sister of Edward, was affianced to David, prince of Scotland; and Robert Bruce paid £20,000 sterling to defray the expenses of the war. He died the next year, having, after a life of incessant toil and warfare, secured the independence of his country, and won the crown, which he left undisputed to his son.

4. **EDWARD**: d. 1318. He was a brother of Robert I., of Scotland, who, after distinguishing himself in the Scottish war of independence, crossed in 1315 to Ireland to aid the native septs against the English. After many successes he was crowned king of Ireland at Carrickfergus, but fell in battle near Dundalk.

5. **DAVID**, son of the preceding, king of Scotland: b. about 1320; d. 22 Feb. 1371. Shortly after his accession, at the age of nine years, his kingdom was invaded, and his crown wrested from him by Edward Baliol, son of that John Baliol whom Edward I. had compelled to resign the crown. In support of his claim Edward III. maintained a fierce strife on the borders, in active though undeclared hostilities to the Scots. David, with his young queen, Jane of England, escaped to France, where he resided till 1341, when, the nobles Murray, Douglas, and Stuart having expelled Baliol from the throne into the northern counties of England, he ventured to return. In 1346, while Edward III., with the flower of his army, was absent in France, David suddenly invaded England at the head of 33,000 men. He was met at Neville's Cross, Durham, by a force of 11,200 irregular troops under Queen Philippa. The Scottish troops were totally defeated, leaving 15,000 men dead on the field of battle and their king a prisoner. From this time until 1357 David was detained a prisoner in the Tower of London, when he was liberated after the battle of Poitiers, on agreeing to pay 100,000 marks in 20 half-yearly instalments.

Bruce, Blanche Kelso, American colored politician: b. Prince Edward County, Va., 1841; d. 1898. Born in slavery but educated with the son of his master, and subsequently a student at Oberlin College, he became a planter in Mississippi in 1869. Entering politics he became a United States senator from Mississippi in 1875, the first negro member of the National Senate. He was appointed register of the United States Treasury in 1881, holding office till 1885, and was reappointed to the same office by President McKinley in 1897.

Bruce, Catherine Wolfe, American patron of science: b. New York; d. there 13 March 1900. She was a cousin of Catherine Lorillard Wolfe, from whom she inherited a fortune, which she used in furthering astronomical study. She gave \$50,000 to the Harvard Observatory in 1888. The Bruce Memorial Telescope at Arequipa, Peru, was her gift. In 1897 she established a gold medal fund for the Astronomical Society of the Pacific.

Bruce, James, Scottish traveler: b. Kinmaird House, Stirlingshire, 14 Dec. 1730; d. there 27 April 1794. He became a wine merchant in 1754, but on the death of his wife he took up the study of languages, and availed himself of the opportunities of his trade to visit Spain, Portugal, and the Netherlands. In 1758 he inherited his father's estate, and he consequently relinquished the wine trade in 1761. Lord Halifax, appreciating Bruce's character, proposed to him a tour of discovery, in which he promised him his protection and support. He pointed specially to the exploration of the coast of Barbary, in completion of the labors of Shaw, and hinted also at the discovery of the sources of the Nile. In the meantime Halifax offered him the consulship of Algiers, which was accepted. His consulship lasted for two years, and on its expiration in 1765 he visited successively Tunis, Tripoli, Rhodes, Cyprus, Syria, and several parts of Asia Minor, where, accompanied by an able Italian draughtsman, he made drawings of the ruins of Palmyra, Baalbec, and other remains of antiquity. Having now formed his plan for visiting Abyssinia, he set out for Cairo in June 1768, after about a year spent in Syria, navigated the Nile to Syene, crossed the desert to the Red Sea, passed some months in Arabia Felix, and reached Gondar, the capital of Abyssinia, in February 1770. On 14 Nov. 1770, he succeeded in reaching the sources of the Abai, then considered the main stream of the Nile. His 'Travels to Discover the Source of the Nile' appeared in 1790 in five large quarto volumes. The authority of the work, in regard to facts of natural history and human manners, was questioned on its first appearance; but the truth of his descriptions, however, has been amply confirmed by travelers who have visited the same regions. This enterprising traveler lost his life in consequence of an accidental fall down stairs.

Bruch, brooh, Max, German composer: b. Cologne 6 Jan. 1838. He studied at Bonn under Breidenstein, and at Cologne as a special pupil of Hiller, in 1853-7. During this period he completed several of his musical compositions. In 1865 he was director of the musical institute of Coblenz; and from 1870 to 1880 lived in Berlin and Bonn. In 1880 he went to Liverpool to become director of the Philharmonic Society; in 1883 he came to the United States and conducted his own oratorio 'Arminius' in Boston; in 1887 he was made a member of the Berlin Academy; and in 1890 obtained the title of royal professor. Bruch ranks among the foremost of the modern composers. His best works include: 'The Flight of the Holy Family'; 'Ulysses'; 'Arminius'; 'Lied von der Glocke' (words by Schiller); 'Achilles'; 'Scenes from the Frithjof's Saga'; 'Roman Triumph Song'; 'Salamis,' etc.

Bruchési, broo-kā'zē, Napoléon Paul, Canadian Roman Catholic prelate: b. Montreal,

20 Oct. 1855. He pursued his theological studies at Paris and Rome, being ordained priest in 1878. In 1887 he was made a canon at the cathedral in Montreal. He was successively vicar at St. Bridget's and St. Joseph's churches in Montreal, and in 1897 was appointed archbishop of Montreal to succeed the late Monsignor Fabre.

Bruchsal, broo'h'säl, a town of Baden, on both sides of the Salzbach, 12 miles from Carlsruhe, now an important railway centre. It is an ancient town, was a common residence of the prince-bishops of Spire from the 12th century, and the residence formerly occupied by them is still standing. This is a building in the rococo style, erected in 1720-70, and in connection with it is a fine garden with fountains. In the Church of St. Peter the prince-bishops were buried. Soap, paper, cigars, etc., are made. Pop. about 15,000.

Bruchus, a genus of beetles belonging to the section tetramera, and the family *Rhynchophora* or *Curculionida*. The antennæ are 14-jointed, and are filiform, serrate, or pectinated, not geniculated as in the more normal *Curculionida*. It contains small beetles which deposit their larvæ in the germs of leguminous plants, and, when hatched, devour their seed. *B. pisi* is destructive to the garden pea.

Brucine, broo'sin (from Brucea), an alkaloid discovered in 1819, and obtained in the preparation of strychnine, from which it is separated by boiling alcohol. It crystallizes in white and transparent prisms, with a rhomboidal base. It has a very bitter taste, but no smell, and is less poisonous than strychnine. It is insoluble in ether, and dissolves in a mixture of 850 parts of cold and 500 parts of boiling water. Nitric acid gives it a scarlet, and sulphuric acid a rosy tint, but both turn gradually to yellow. A solution of copper turns it to violet. These reactions distinguish brucine both from strychnine and morphine. The salts of brucine are tolerably numerous, and are prepared by double decomposition, or by direct combination of the brucine with the acid. They are for the most part crystallizable, and like the base have a bitter taste. They are not used in medicine. Symbol $C_{24}H_{28}N_2O_4 + 4H_2O$.

Brucioli, or **Bruccioli**, Antonio, än-tö'në-ö broo-chë-ö'le, Italian reformer and scholar: b. Florence, about 1500; d. after 1554. In 1522, having become implicated in a conspiracy against Giulio di Medici, who then governed Florence in the name of Leo X., he took refuge in France, where he became acquainted with the doctrines of the reformers, and probably embraced them. On the expulsion of the Medici in 1527 he returned to Florence, but, by his free declamation against monks and clergy, brought his orthodoxy in question, and was imprisoned on several charges, among which that of heresy was included. He would have been executed but for the interference of powerful friends, who obtained a commutation of his sentence into banishment. He retired to Venice with two brothers, who were printers, and availed himself of their press to publish a great number of works, of which the most celebrated is a translation of the Bible into Tuscan. The boldness of his annotations caused it to be ranked as a heretical work. Brucioli was living in 1554, but the exact date of his death is not known. The

number of his volumes is said to have exceeded that of his years. Among his works are Italian translations of Pliny, Aristotle, and Cicero, and annotated editions of Petrarca and Boccaccio.

Bruçite, a native hydrate of magnesia, having the formula $Mg(OH)_2$. It has a hardness of 2.5 and a specific gravity of about 2.4. Its color is white, often tinted blue or green. At Texas, Pa., it crystallizes in hexagonal (rhombohedral), tabular plates whose bases show pearly lustre while the edges are vitreous to waxy. A fibrous, pearly variety occurs at Hoboken, N. J. Delicate blue and green crystals were found at Tilly Foster, N. Y. Bruçite was named for Dr. A. Bruce, an American mineralogist who first described it as a species.

Bruck, Karl Ludwig, kärl lood'-vīg brook (BARON), Austrian statesman: b. Elberfeld, 8 Oct. 1798; d. Vienna, 23 April, 1860. In 1821 he went to Trieste in order to take part in the war for Grecian independence, and remaining there several years, founded the Trieste Lloyd (later the Austrian Lloyd), a combination of insurance societies. In 1848 he was a member of the German National Assembly; after the Vienna revolution of October 1848 he became minister of commerce and public works. In this office he introduced a number of reforms in the industrial policy of the government, established important telegraph lines, built a number of highways and railroads, and founded the Austro-German postal union. In 1849 the emperor gave him the rank of baron, but in 1851 he was compelled to resign his ministry. In 1855 he became minister of finance; he was not able to introduce the reforms he wished, and when a period of general financial disaster resulted from the Italian war, Bruck was personally blamed. He accordingly obtained his dismissal from the emperor and the next day committed suicide. He was officially declared innocent one month after his death.

Brucker, Johann Jakob, yō'hän yā-kōb brook'ër, German historian: b. Augsburg, Bavaria, 22 Jan. 1696; d. there, 26 Nov. 1770. He was educated at Jena, and in 1744 became pastor at Augsburg. His most important work is a 'Critical History of Philosophy' (1741-4), in Latin, which was the first complete history of the different philosophical schools. It contains biographical matter of great value.

Bruckner, Anton, än'tōn brook'nër, Austrian organist and composer: b. Ansfelden, 4 Sept. 1824; d. 11 Oct. 1896. He was mostly self-educated, but after serving as organist in the cathedral at Linz he studied for a time in Vienna under Simon Sechter, whom he succeeded as court organist. He later became professor at the Vienna conservatory and lecturer on music at the University. Bruckner is to some extent an imitator of Wagner; his best known compositions are his symphonies; he has written also some religious music, including a Te Deum and several masses.

Brueis, or **Bruys d'Aigalliers**, François Paul, French admiral: b. Uzès, 11 Feb. 1753; d. 1 Aug. 1798. He entered the navy at an early age, and gradually rose in the service. In 1798 he was employed to convey Bonaparte and his army, which were to effect the conquest of Egypt and the East, and having managed to elude the vigilance of Nelson, who had been

BRUGES — BRUGSCH

long watching for him, reached the Bay of Abukir, and disembarked the troops in safety. Brueis moored his fleet in a position naturally so strong that he deemed it impregnable; but by the heroic daring of Nelson, he found the precautions which he had taken turned to his disadvantage. In the battle which ensued, he fell fighting boldly, a little before his ship, the *Orient*, of 100 guns, blew up. See **ABUKIR**.

Bruges (Flemish, *Brugge*), a city of Belgium, capital of West Flanders, situated about 60 miles northwest of Brussels, about 8 miles from the sea, surrounded and intersected by canals which connect it with Ostend and other places. By these canals fairly large vessels can reach Bruges; and a ship canal to connect it with the sea at Zeebrugge, a port on the North Sea, $7\frac{1}{2}$ miles distant, was begun 25 Feb. 1900. This will allow ships of 25 feet draft to reach the wharves of the city. Bruges has over 50 bridges, all opening in the middle for the passage of vessels. The Halles (containing cloth and other markets) is a fine old building, with a famous belfry or tower 350 feet high, in which is a fine carillon of 48 bells. Bruges has also a beautiful town hall dating from the 14th century; a palace of justice, noted for a magnificently adorned fireplace; an academy of painting, sculpture, and architecture; a public library, etc., and many valuable specimens of architecture and sculpture. In the Church of Notre Dame, which has a spire 290 feet high, are the splendid tombs of Charles the Bold and of Mary of Burgundy, his daughter, constructed in 1550, besides many other artistic treasures. The cathedral of Saint Sauveur dates from the 13th and 14th centuries, and is unattractive externally, but has a fine interior, and there are other notable churches. Philip the Good here founded the order of the Golden Fleece in 1430; and the celebrated Jan Van Eyck, or John of Bruges, the supposed inventor of painting in oil, was born here. From the 7th century Bruges was rapidly acquiring importance. It was fortified by Count Baldwin in 837, walled first in 1053, and again in 1270. During the government of the rich and powerful counts of Flanders, who resided there from the 9th to the 15th centuries, its woolen manufactures grew and flourished to an amazing extent. The wealth of the citizens was enormous; a single merchant gave security for the ransom of Jean sans Peur, the last count of Flanders, to the amount of 400,000 crowns of gold. Under the Austrian dynasty, at the close of the 15th century, the rebellious conduct of the inhabitants of Bruges called upon it such destructive vengeance that henceforth its greatness died away, its trade was transferred to Antwerp, and the religious persecution and ferocity of the Spanish under Philip II. and the Duke of Alva completed the process of its ruin. The remains of ancient buildings, abandoned monasteries, and streets half deserted from the diminished population of the modern city, give Bruges an antiquated and venerable appearance. Many of the houses are very old, but in a state of excellent preservation. Bruges is still, by means of its canals, an entrepôt of Belgian commerce. The chief articles manufactured here are lace, linen, damasks, light woolen goods, cottons, mixed stuffs, beer, etc. It exports agricultural produce and manufactured goods, and imports wine, oil,

colonial produce, etc. Pop. about 54,000. See Gilliat-Smith, 'Bruges' in 'Mediaeval Towns Series' (1901).

Brugg, a town in the Swiss canton of Aargau, on the right bank of the Aar, and near the mouth of the Reuss, 36 miles east-southeast of Basel by rail. Near it is the site of Vindonissa, the chief Roman station in Helvetia; and it was also the cradle of the house of Hapsburg, whose ruined castle, founded in 1020, crowns a wooded height two miles distant. Nearer is the abbey of Königsfelden (1310; converted in 1872 into an asylum), in the vaults beneath which are interred many of the members of the Austrian royal family. Zimmermann, the philosopher, was born here in 1728. Pop. about 3,000.

Brugmann, Friedrich Karl, fréd'-rîn kârl broog-man, German philologist: b. Wiesbaden, 16 March 1849. He was educated at Halle and Leipsic; was instructor in the gymnasium at Wiesbaden and at Leipsic; and in 1872-7 was assistant at the Russian institute of classical philology at the latter place. In 1877 he was lecturer at the University of Leipsic, and in 1882 became professor of comparative philology there; in 1884 he took the same position at the University of Freiburg, but returned to Leipsic in 1887 as successor to Curtius. He is one of the chief representatives of the new school of philologists and his researches have done much to revolutionize the study of philology. As joint editor with Curtius of 'The Studies in Greek and Latin Grammar,' he wrote an article for this work on 'Nasilis Sonans,' in which he defended theories so radical that Curtius afterward disclaimed them. His conclusions are now generally accepted. His most important work, summarizing his conclusions, is 'Outline of the Comparative Grammar of the Indo-Germanic Languages' (translated into English); he also wrote 'Morphological Researches in the Indo-Germanic Languages' (with Osthoff); 'A Problem of Homeric Textual Criticism' (1870); 'Lithuanian Folk Songs and Tales' (1882); 'The Present Position of Philology'; 'Greek Grammar'; and 'Short Comparative Grammar' (1902). Brugmann was knighted by the king of Saxony, and in 1896 received the degree of LL.D. from Princeton University.

Brugsch, Heinrich Karl, German Egyptologist; b. Berlin, 18 Feb. 1827; d. Charlottenburg, 9 Sept. 1894. A work entitled 'Scriptura Ægyptiorum Demotica,' published in 1848, gained him the favor of Alexander von Humboldt and Frederick William IV., the latter of whom enabled him to complete his studies by visiting the museums of Paris, London, Turin, and Leyden. In 1853 he made his first visit to Egypt and assisted Mariette in his researches, being appointed on his return in the following year assistant in the Berlin Egyptian Museum. He accompanied the Prussian embassy to Persia in 1860, and four years later became consul at Cairo. Returning in 1868, he was appointed to the chair of Egyptology at Göttingen, but soon resigned in order to take charge of the Cairo School of Egyptology. He was soon raised to the rank of bey, and some time afterward to that of pasha. In 1876 he came to the United States as Egyptian commissioner to the Centennial Exposition at Philadelphia. In 1883

he traveled in Egypt, Syria, Greece, and Italy, with Prince Frederick Charles of Prussia, and in 1885-6 he twice visited Persia, partly on official business. He was again in Egypt in 1891, and in the following year he made a journey to the Libyan desert. Brugsch's chief work is the *Hieroglyphisch-demotisches Wörterbuch* (1867-82). His other writings include 'Reiseberichte aus Ägypten' (1855); 'Grammaire Démotique' (1855); 'Monuments de l'Égypte' (1857); 'Geographische Inschriften altägyptischer Denkmäler' (1857-60); 'Histoire d'Égypte' (1859); 'Recueil des Monuments Égyptiens' (1862-85); 'Reise der königlich Preussischer Gesandtschaft nach Persien' (1862-3); 'Hieroglyphische Grammatik' (1872); 'Geschichte Ägyptens unter den Pharaonen' (1877); *Dictionnaire Géographique de l'ancienne Égypte* (1877-80); 'Religion und Mythologie der alten Ägypter, nach den Denkmälern' (1888); *Thesaurus Inscriptionum Egyptiacarum* (1883-91); 'Die Ägyptologie' (1890); 'Aus dem Morgenlande, Altes und Neues' (1893); etc. His 'History of Egypt from the Monuments' has appeared in English. In 1894 his autobiography appeared under the title 'Mein Leben und Wandern.'

Brühl, Heinrich (COUNT VON), Saxon politician: b. Weissenfels, Prussia, 13. Aug. 1700; d. Dresden, 28 Oct. 1763. As a page he gained the favor of Frederick Augustus I. of Poland, and on the death of the king in 1733, the crown of Poland with the other regalia being, through the good fortune of Brühl, intrusted to him, he carried them immediately to the new elector, Augustus III., and showed the greatest activity in promoting his election. He had cunning and skill sufficient to govern his master and get rid of his rivals and succeeded in keeping everybody at a distance from the king. No servant entered his service without the consent of Brühl, and even when he went to the chapel all approach to him was prevented. Brühl kept 200 domestics; his guards were better paid than those of the king himself, and his table more sumptuous. Frederick II. says of him, "Brühl had more garments, watches, laces, boots, shoes, and slippers, than any man of the age. Caesar would have counted him among those curled and perfumed heads which he did not fear"; but Augustus III. was no Caesar. When this idle prince loitered about smoking, and asked, without looking at his favorite, "Brühl, have I any money?" "Yes, sire," was the continual answer; and to satisfy the king's demands he exhausted the state, plunged the country into debts, and greatly reduced the army. At the beginning of the Seven Years' War it comprised but 17,000 men, and these were compelled to surrender at Pirna from want of the necessary supplies. Brühl fled with the king, the pictures, and the china, to Poland; but the archives of the state were left to the victor. He was no less avaricious of titles and money than of power. An examination after his death showed that he owed his immense fortune to the prodigality of the king rather than to unlawful means of accumulation. His own profusion was often beneficial to the arts and sciences.

Bruhns, bröns, Karl Christian, German astronomer: b. Plön, Holstein, 22 Nov. 1830; d. Leipsic, 25 July 1881. He was the son of a locksmith, going in 1851 as locksmith and mechanic to Borsig, and then to Berlin with Sie-

mens and Halske, he attracted the attention of Encke by his remarkable powers as a computer, and was appointed in 1852 as assistant, and in 1854 as observer, in the Berlin Observatory, and in 1859 as instructor in the university. In 1860 he was called to Leipsic as professor of astronomy and director of the new observatory to be constructed there, which, under his skilful direction, grew into one of the finest structures of its kind in Europe. He is known as the discoverer of five comets, an able computer of cometary and planetary orbits, and for his important work in geodesy in connection with the European triangulation.

Bruise, or Contusion, an injury caused by a blow or sudden pressure, in which the skin is not wounded, and no bone broken or dislocated. Both terms, but more particularly the latter, are employed in surgery to include all such injuries from a black eye to a thoroughly crushed mass of muscle. In the slighter forms of this injury, as in ordinary simple bruises, there is no tearing, but only a concussion of the textures, the utmost damage done being the rupture of a few small blood vessels, occasioning the discoloration always observed in these cases. In more severe contusions, the subjacent structures—muscles, connective tissue, vessels, etc.—are more or less ruptured, and in extreme cases are thoroughly crushed and usually become gangrenous. The quantity of blood extravasated depends chiefly upon the size and number of the ruptured blood vessels, but partly also on the nature of the textures of the injured part. Thus, a lax tissue, as that of the eyelids, favors the escape of blood into the surrounding parts. Simple and not very severe bruises require little treatment other than the rest necessary for the avoidance of pain; but the removal of the swelling and discoloration may be hastened by the application of various local stimulants, which seem to act by accelerating the circulation through the bruised part, and promoting the absorption of the effused fluid. Friar's balsam, compound soap liniment, or poultices made with the roots of black bryony beaten to a pulp, are popular remedies of this class. Tincture of arnica has a great reputation; but experiments have made it very doubtful whether it is any more efficacious than simple spirit of the same strength. A solution of sulphurous acid, and hazeline and other preparations of the American witch-hazel are of more value. They should be kept constantly applied to the bruised part on lint or cotton wool. Pugilists, who are probably better acquainted with ordinary bruises than any other class of men, are in the habit of removing the swelling of the eyelids that often naturally occurs during a prize fight to such an extent as to close the eyes, by at once puncturing the eyelids at several points with a lancet; and their favorite remedy for a black eye or other bruise on the face is a fresh beefsteak applied locally as a poultice. Bruises of a more severe nature, as when there is much breaking or crushing of the tissues, must, of course, at once be referred to the care of a surgeon.

Brüll, Ignaz, Austrian pianist and composer: b. Brossnitz, 7 Nov. 1846; d. 17 Sept. 1907. He was educated at Vienna under Epstein and Dessoff and played at concerts there and in London. His first composition appeared in 1861

and afterward he became instructor at a school of music in Vienna and has won distinction as a composer. His works include several numbers for the piano; orchestral pieces and operas, among them, 'The Beggar of Samarkand'; 'The Golden Cross'; 'Bianca'; 'Queen Marietta'; 'The Heart of Stone'; and 'The Hussar.'

Brumaire, brü-mâr', the second month of the year in the French revolutionary calendar. It commenced on 23 October and ended on 21 November, thus comprising 30 days. It received its name from the fogs that usually prevail about this time. The 18th of Brumaire, VIII. year (9 Nov. 1799), is celebrated for the overthrow of the directory and the establishment of the sway of Napoleon. See CALENDAR.

Brumidi, broo-mé'dē, Constantine, Italian painter: b. Rome, 20 June 1805; d. Washington, D. C., 29 Feb. 1880. After study in his native city he was given many important commissions, and some of his best works are found in the Vatican and the more modern Roman palaces. The occupation of Rome by the French caused him to emigrate to America, and in 1852 he became a citizen of the United States. After settling in this country he executed much of the decoration of the national capitol, and began work on a series of historical paintings, forming a belt about the base of interior of the dome, the first frescoes in America.

Brummagen, Joe. See CHAMBERLAIN JOSEPH.

Brummel, George Bryan ("BEAU BRUMMEL"), English dandy: b. London, 1778; d. Caen, 29 March 1840. He was educated at Eton and Oxford, at both of which places he acquired great distinction by his taste in dress, which afterward made him the autocrat in the world of fashion. At the age of 16 he casually made the acquaintance of the Prince of Wales, afterward George IV., who conceived a wonderful fancy for him and made him a cornet in his own regiment, the 10th Hussars. Brummel was now introduced into the most aristocratic society in England, and through the favor of the prince had rapid promotion in the army, though his carelessness was such that he often did not know his own troop. The death of his father in 1794 put him in possession of a fortune of £30,000, which he expended in a course of sumptuous living, extending over a period of 21 years, during which his dicta on matters of etiquette and dress were received in the *beau monde* as indisputable. He kept a magnificent bachelor establishment, gave splendid dinners, and basked in all the sunshine that youth, money, and princely favor could bestow. But the fickle temper of the prince regent at last tired of Brummel, and an estrangement took place. The beau's creditors now began to be clamorous, and in 1814 he crossed the channel to Calais, where he resided for many years, partly supported by the remains of his own fortune and partly by remittances from friends in England. In 1824, when George IV. passed through Calais on his way to Hanover, Brummel ventured again to address himself to him, but was unceremoniously repulsed. Subsequently to this he was appointed consul at Caen, but after holding this office for a few years it was abolished as unnecessary, and he was reduced to absolute poverty. His mind, too, gave way, and he died in a lunatic asylum.

Brun, or Brunn, Malte-Conrad (generally known as MALTE-BRUN), Danish geographer: b. Thisted, Jutland, 12 Aug. 1775; d. 14 Dec. 1826. While yet very young he produced some poems which gave great promise of his rising to eminence as a poet, though his father had destined him for the Church. About this time the French Revolution called forth a host of ardent champions of the cause of progress throughout Europe, and the young poet embraced it with enthusiasm. He abandoned the Church for the bar, and subsequently became editor successively of two journals, in which his advocacy of liberal principles provoked a state prosecution that compelled him to take refuge in the Swedish island of Hven, once the residence of Tycho Brahe. From this he shortly afterward received permission to return to Copenhagen; but some fresh attacks on the government again made him an exile, and he retired first to Sweden and then to Hamburg, where a wealthy merchant entrusted him with the education of his children. Not long after, his admiration of Napoleon Bonaparte, then rapidly advancing to the head of affairs, prompted him to take up his abode in France; but the elevation of his idol to the post of consul for life opened Brun's eyes to his ambitious designs. He had the courage openly to blame the weakness of the senate in yielding to them, and for the time withdrew from the pursuit of politics. He now directed his attention to the science of geography. In 1803 he published, along with Mentelle and Herbin, the commencement of 'Géographie Mathématique, Physique, et Politique de toutes les Parties du Monde,' a work which was completed in 16 volumes in 1807, and in the composition of which Brun's share amounted to about a third. Before the completion of this work his reputation as a writer had been firmly established, and in 1806 he received an appointment on the staff of the *Journal des Débats*, for which he continued to write articles on foreign politics until his death. In 1808 appeared his 'Tableau de la Pologne,' and the same year he joined M. Eyriès in starting the 'Annales des Voyages, de la Géographie, et de l'Histoire,' which proved the introduction into France of regular periodical geographical literature. In 1810 was published the first volume of his 'Précis de la Géographie Universelle,' completed in eight volumes in 1820, and reissued in 12 volumes in 1831. During the Hundred Days Brun adhered to the legitimist cause, and published an 'Apologie de Louis XVIII.' Toward the end of 1821 he lent powerful assistance in establishing the Société de Géographie. Besides the works already mentioned, he was the author of various geographical and political treatises too numerous to particularize.

Brunai, broo-nā'ē, **Brunel**, broo-nā'ē, or **Bruni**, broo'nē, Borneo, a territory on the northwest part of the island, situated between Sarawak and British North Borneo, under the protection of Great Britain. It has an area of about 18,000 square miles. It exports sago, gutta-percha, rubber, etc. Until 1888 it was nominally an independent Mohammedan territory, whose sultan was formerly overlord of the whole island. Its population is variously estimated at from 50,000 to 125,000, divided into trade castes. The capital, Brunai, on a river

BRUNANBURGH — BRUNE

of the same name, about 14 miles from its mouth, is a miserable, dirty town, built on piles, with some 30,000 inhabitants, who trade with Singapore.

Brunanburgh, broo-nān-bur'ō, Scotland, the scene of a battle in which Athelstan and the Anglo-Saxons defeated a force of Scots, Danes, etc., in 937; locality very doubtful. The battle forms the subject of one of the oldest Anglo-Saxon poems.

Brunck, Richard Francois Philippe, riñ'ärt fräntz fē-lēp broonk, French critic: b. Strasburg, 30 Dec. 1729; d. same place, 12 June 1803. He made rapid progress in learning when he studied with the Jesuits in Paris, but neglected study as soon as he entered into active life. While in winter quarters at Giessen, as commissary of war during the French campaigns, he resided with a professor who, by his advice and example, revived his love of letters and led him to the study of the classics. When Brunck returned to Strasburg he devoted all his leisure time to Greek, and at the age of 30, and while holding public office, attended the lectures of the Greek professor of the university. The zeal which had encouraged him to undertake this laborious study was increased by the pleasure of overcoming difficulties, and he became fixed in the conviction that all the instances of apparently careless writing in the Greek poets were only errors of the transcribers. Entertaining this opinion, he altered whatever displeased him, overthrew the order of the verses, and permitted himself liberties which criticism must needs reject. To this rage of altering he gave himself up, particularly in the marginal comments of his books, and in the numerous copies which he made of the Greek poets, more for his own pleasure than for use. This arbitrary process is so visible, even in the editions he has published, that much caution is required in using them. Brunck has nevertheless been of essential service to Greek literature, and since the revival of letters few scholars have so effectually promoted it. He published a valuable edition of Virgil. Of his Greek editions mention may be made of those of the 'Analecta,' 'Apollonius Rhodius,' 'Aristophanes,' 'The Gnomie Poets,' and his masterpiece, 'Sophocles,' for which the king allowed him a pension of 2,000 francs. At this time the French Revolution interrupted his studies. He adopted the new ideas with enthusiasm, but without deviating from the principles of moderation. He was arrested at Besançon during the Reign of Terror, and did not obtain his liberty until after the death of Robespierre. In 1791 and again in 1801 economical reasons obliged him to sell part of his library. As he was passionately fond of his books, and his former fortune had enabled him to collect an excellent library, this was a severe privation. From this time Greek became his aversion; but he prepared an edition of Terence, and had Plautus ready for publication when he died in 1803. Many of his papers are in the library at Paris.

Brundu'sium, or **Brundis'ium**, now BRINDISI, brīn-dē'sē, Italy, a city of Calabria, on the shores of the Adriatic. It was taken by the Romans 267 B.C., and became a colony of the republic 244 B.C. During the Illyrian war, 229 B.C., it was the naval and military station for the

Roman fleet and army, and its fine harbor rendered it on many subsequent occasions the centre of warlike operations. Vergil died here 19 B.C.

Brune, Guillaume Marie Anne, gē-yōm mā-rē ān broon, French soldier: b. Brives la Gaillarde, 13 March 1763; d. 2 Aug. 1815. While young he went to Paris to study law. At the breaking out of the Revolution he was a printer and had made himself known by some small pieces of his own composition. He now devoted himself ardently to politics, was connected with Danton, and played an active part in the tempests of that period. Till 10 Aug. 1792 he was engaged in publishing a daily newspaper. Afterward he went as civil commissary to Belgium. In 1793 he entered the military service in the revolutionary army in the Gironde. He aided Barras to put down the Jacobins, who had assaulted the camp of Grenelle, 10 Oct. 1795. Afterward he distinguished himself as general of brigade in the Italian army, in the battle of Arcola and in the attack on Verona. When the directory of Switzerland declared war Brune received the chief command of an army, entered the country without much opposition in January 1798, and effected a new organization of the government. In 1799 he received the chief command in Holland, defeated the British, 19 September, near Bergen, and compelled the Duke of York to agree to the treaty of Alkmaar, 18 October, by which the British and Russians were to evacuate the north of Holland. In January 1800, he was made a councilor of state, and was placed at the head of the Army of the West, in occupation of La Vendée, and contributed greatly to the re-establishment of tranquillity in the revolted province. He was appointed commander-in-chief of the Italian army 13 August. Toward the end of December he led his troops over the Mincio, conquered the Austrians, passed the Adige 8 Jan. 1801, took possession of Vicenza and Roveredo, and concluded an armistice, 16 January at Treviso, with the Austrian general Bellegarde, by which several fortified places in Italy were surrendered to the French troops. When peace recalled him to the council of state toward the end of November 1802, he laid before the legislative body for confirmation the Treaty of Peace with the court of Naples. Next year he went as ambassador to Constantinople. He prevailed there at first over the British party, and received from the Turkish ministry the highest marks of honor; but when new dissensions arose between the two powers he left Turkey. During his absence, 19 May 1804, he was appointed marshal of the empire. At the end of 1806 Napoleon appointed him governor-general of the Hanseatic towns, and soon after commander of the troops in Swedish Pomerania against the king of Sweden. This monarch invited the marshal to a personal interview, in which he endeavored to convert him to the cause of Louis XVIII. Brune refused every proposal. After the revolution of 1814 he acknowledged Louis XVIII., and received the cross of Louis, but no appointment. This was the cause of his declaring himself for Napoleon immediately upon his return. He received the chief command of an important army in the south of France and was made a peer. When circumstances changed again he delayed a long time before he gave up Toulon, which was in his possession in 1815, to the troops of

Louis XVIII., and sent in his resignation to the king. This circumstance, the severities exercised by his command, and a report that he was the murderer of the Princess Lamballe, excited popular feeling against him. While retreating from Toulon to Paris he was recognized at Avignon by a royalist mob, which broke into his hotel and shot him. His body was exposed to the most shameful insults, and then thrown into the river Rhone.

Brunel, or Bruni. See BRUNAI.

Brunel, broo-něl', Isambard, i'sam-bärd, Kingdom, English engineer: b. Portsmouth, (son of Sir Mark Isambard Brunel, q.v.), 9 April 1806; d. 15 Sept. 1859. He was educated at the Henri IV. College at Caen, France. The bent of his genius was toward mechanical pursuits, and at the age of 20 he commenced practical engineering under his father at the Thames Tunnel, for which he acted as resident engineer. During the progress of the works he was more than once in imminent danger of his life by the breaking in of the river, and only saved himself by swimming. His attention was mainly directed to steam navigation and railway engineering, and of his works in these departments may be mentioned, among others, the Great Western, Great Britain, and Great Eastern steamships; the entire works on the Great Western Railway, to which he was appointed engineer in 1833; and the railway viaduct over the Tamar at Saltash. He was also the engineer of the Hungerford suspension bridge. The genius of the younger Brunel was undoubted, but in carrying through his operations he was like his father, too apt to regard merely the attainment of a grand and brilliant result without taking into consideration the losses and expense which might thereby be occasioned to those who had invested their capital in the undertaking. This was more especially the case with the Great Western Railway. It was remarked, in contrasting him with George Stephenson, that the works of the former never paid, while those of the latter always did. While on board the Great Eastern—his last work—the day before she quitted the Thames on her first disastrous cruise, Mr. Brunel was suddenly seized with paralysis and had to be carried home. In a week afterward he expired. He became a Fellow of the Royal Society in 1830, and D.C.L. of Oxford in 1857.

Brunel, Sir Mark Isambard, English engineer: b. Hacqueville, near Rouen, 25 April 1769; d. 12 Dec. 1849. He was the son of a Normandy farmer, and educated at the seminary of St. Nicaise, Rouen. From early boyhood he displayed a decided turn for scientific and mechanical pursuits, amusing himself with the construction of ships, musical instruments, and machines of different sorts. At the age of 15 he went to Rouen, where he took a course of lessons in drawing, perspective, and hydrography. In 1786 he entered the French naval service and made several voyages to the West Indies, in which he distinguished himself both by his inventive mechanical genius and the attention and ability with which he discharged the duties of a seaman. In 1793 he returned to France, and, having paid a visit to Paris, and taken part in the proceedings at one of the political clubs, he narrowly escaped proscription by venturing to oppose the ferocious doctrines then

current, and was obliged to make his escape to America. Shortly after his arrival there he joined a party of Frenchmen in an expedition to explore the regions around Lake Ontario, and in 1794 he was appointed one of the surveyors of the canal now connecting Lake Champlain and the river Hudson. He was afterward employed, both as engineer and architect, on various undertakings in the city of New York, including the erection of forts for its defense and the establishment of an arsenal and foundry. In 1799 he went to England and settled at Plymouth, where he married Miss Sophia Kingdom, whom he had formerly known at Rouen. His first work in this country was the construction of a copying-machine; and he soon established his reputation as a mechanician by the invention of a machine for making the block-pulleys for the rigging of ships, which effected an immense saving in labor and expense and is still in full operation in English naval dockyards. Of Brunel's subsequent achievements may be mentioned more especially the erection of the steam saw-mill in Chatham dockyard; a machine for making seamless shoes for the army; machines for making nails and wooden boxes, for ruling paper and twisting cotton into hanks; and lastly, a machine for producing locomotion by means of carbonic acid gas, which, however, though partially successful, was ultimately abandoned. But the great work by which his name will be transmitted to posterity was the Thames tunnel, which, though almost a complete failure as a commercial speculation, was nevertheless a wondrous monument of engineering skill and enterprise. It was commenced in March 1825, and opened to the public in 1843, after a multitude of disasters and obstacles had been endured and surmounted. He was elected a Fellow of the Royal Society in 1814, and vice-president from 1832-3. In 1841 the honor of knighthood was conferred on him.

Brunelleschi, Filippo di Ser Lappi, fê-lêp' pō dē sār lăp'pē broo-něl-lêsh'ē, Italian architect: b. Florence, 1377; d. same place, 15 April 1446. He first studied painting and sculpture, and brought the art of perspective to perfection; but as an architect he gained most distinction, having, according to his countrymen, revived the Doric, Ionic, and Corinthian orders. He invented various ingenious mechanical contrivances. He applied himself particularly, however, to architecture; and learned the art of drawing to make his architectural plans; statuary, to adorn them; and mechanics, that he might be able to raise the materials. He was also profoundly versed in mathematics and geometry. He is said to have drawn views of the finest monuments in Florence in perspective—an art which then excited much astonishment. This varied knowledge prepared him for bold and difficult undertakings, and he gained the name of the restorer of architecture. As a statuary he was much indebted to his intimate connection with Donatello, who was then very young but very able. Both went to Rome. Here Brunelleschi conceived the idea of restoring architecture to the principles of the Greeks and Romans in the hope of making the revived classic forms supersede the Gothic then in vogue. When the architects assembled in 1407 at Florence to consult on the building of the dome of the Cathedral of Santa Maria, the plan which

Brunelleschi proposed received but little attention, and he went back to Rome.

It was necessary, however, to have recourse to him, as the undertaking far surpassed the powers of the other architects. He engaged to erect a dome which, by its own weight and by the strong connection of its parts, should hang suspended. This proposal seemed so wonderful that the author was regarded as insane. As all other plans, however, failed to answer the expectations of the magistrates, Brunelleschi was again recalled, and ordered to explain the mode in which he intended to execute his plan. This he refused to do, but built two small chapels according to his new system. On this the charge of erecting the dome was committed to him. Aided only by his own genius he accomplished the work, which remains one of the boldest creations of the human mind. But the ingenious lantern, which formed the upper part of the dome, was not finished when he died in 1444. It was completed, however, according to his first design. Few monuments of architecture are so noble as this wonderful building. Only the dome of St. Peter's in Rome, which was built since, excels it in height, but is inferior to it in lightness and grandeur of style. Michael Angelo said it was difficult to imitate Brunelleschi and impossible to excel him. Brunelleschi was the author of a great number of other masterpieces of architecture.

Brunet, Jacques Charles, zhāk shārl broo-nā, French bibliographer: b. Paris, 2 Nov. 1780; d. same place, 14 Nov. 1867. He began his bibliographical career by the preparation of several auction catalogues, of which the most interesting is that of the Count d'Ourches (Paris 1811), and of a supplementary volume to Cailleau's and Duclos' *Dictionnaire Bibliographique* (Paris 1802). In 1810 was published the first edition of his *Manuel du Libraire et du l'Amateur de Livres*, in three volumes, which gained such universal applause that in 1814 a second, and in 1820 a third edition, of four volumes each, were demanded. This work showed him the worthy successor of the meritorious Debure. A sixth edition of his great work appeared between 1860 and 1865 in six volumes, the last containing a *Table Méthodique*, or classified catalogue, in which the works are arranged in classes according to their subjects.

Brunetière, Ferdinand, French critic: b. Toulon 19 July 1849; d. Paris 9 Dec. 1906. He was editor of the *Revue des Deux Mondes* and became a member of the French Academy in 1893. In criticism he inclined to the idealist as opposed to the naturalist school, and was a severe critic of literary fads. His principal works are: *'History and Literature'* (1884); *'The Naturalist Romance'* (1883); *'Essays on Contemporary Literature'* (1892); *'Epochs of the French Theatre'* (1892). In 1897 he delivered a series of lectures in Harvard, Johns Hopkins, and Columbia universities.

Brunhilda, broon-hil'da, the name of (1) a legendary, (2) a historical person.

1. In the *'Nibelungenlied'*, the young and stalwart queen of Iceland, wife of Gunther, the Burgundian king. She passionately hated Kriemhild and her husband, Siegfried, who had once been her own lover; and she caused his murder by the hands of Hagen. Originally she was identical with the Norse Walkyrie Bryn-

hildr, who, for a fault, was stripped of her divinity by Odin and sank into a charmed sleep, from which she was awakened by Sigurd (Siegfried).

2. The daughter of the Visigothic king Athanagild, who married King Sigbert of Austrasia in 567, and afterward, as regent of her two grandsons, Theodebert II., king of Austrasia, and Theodoric II., king of Burgundy, divided the government of the whole Frankish world with her rival Fredegunda, who governed Neustria for the youthful Clotaire II. On the death of Fredegunda in 598, she seized on Neustria, and for a while united under her rule the whole Merovingian dominions, but was overthrown in 613 by a combination in their own interests or the Austrasian nobles under the nominal leadership of Clotaire II., and put to death by being dragged at the heels of a wild horse.

Bruni, broo'nē, Bru'no, or Bru'nus, Leonardo, lä-o-nār'do (*'ARETINO'*) from his birth-place), Italian humanist: b. Arezzo, 1370; d. Florence, 9 March 1444. He studied law and philosophy at Florence, but under the influence of the Greek scholar Chrysoloras finally took up the study of the classics. In 1405 he obtained a position as papal secretary, an office which he held under four Popes, Innocent VII., Gregory XII., Alexander V., and John XXIII. He went with the latter to the council of Constance in 1414, but in 1415 he moved to Florence, where he devoted himself to literary work. Here he wrote his history of Florence in 12 volumes, for which service he obtained the right of citizenship and was made state secretary there in 1427. He translated the works of Aristotle, Plato, Plutarch, Demosthenes, and Æschines. He wrote also *'Commentarius Rerum Suo Tempore Gestarum'*; *'De Origine Urbis Mantuæ'*; *'De Romæ Origine'*; and *'Epistolæ Familiæres.'*

Bruni, brōō'nē, Island, Australasia, an island off the southern part of the east coast of Tasmania, from which it is separated by D'Entrecasteaux Channel. It has a length of 32 miles, a varying breadth of 1 to 11 miles, and an area of 160 square miles. Coal is mined.

Brunings, Christian, Dutch engineer: b. Neckerau, 1736; d. 1805. In 1769 the states of Holland appointed him general inspector of rivers. This introduced him to a share in several important commissions; for instance, that for the improvement of the dike system in 1796; that for draining the tracts between Nieuwskogs and Zevenhoven in 1797, etc. His most important works were his improvements in the diking of the lake of Haarlem, the improved diking and deepening of the Oberwasser, which at high tides often inundated vast extents of country, together with the change in the course of the Waal and the canal of Panterde, by which the beds of the Rhine, the Waal, and the Leck were improved.

Brunn, Heinrich von, hīn'rīh brun, German archæologist: b. Wörlitz, Anhalt, 23 Jan. 1822; d. Munich, 23 July 1894. He was professor of archæology at Munich, and published several works of high repute among scholars.

Brünn, Austria, the capital of Moravia, and of a circle of the same name, situated on the railway from Vienna to Prague, 70 miles north-by-east of Vienna, and nearly encircled by the rivers Schwarza and Zwittera. It con-

sists of an older portion in the centre, surrounded by fine promenades and pleasure-grounds that have taken the place of the old walls and ramparts, and of extensive newer quarters and suburbs surrounding this. It contains a cathedral and other handsome churches; a landhaus, where the provincial Diet meets; several splendid palaces, a gymnasium, polytechnic institute, museum, botanic garden, etc. It has extensive manufactures of woollens, which have procured for it the name of the Austrian Leeds, and in some 70 works employs about 12,000 hands. Other industries embrace cotton, linen, jute, machinery, hardware, chemicals, soap, and candles; beer and spirits. It is the centre of the Moravian commerce, a great part of which is carried on by fairs held at Brünn every three months. Near it is the fortress of Spielberg, on a hill about 940 feet high, in which Baron Trenck and Silvio Pellico were confined, and which now serves only as a prison. It is surrounded with finely laid-out grounds. Brünn was formerly a free imperial city, an important fortress, and the residence of the margraves of Moravia. It was unsuccessfully besieged by the Taborites in 1428; by Torstenson in 1645; by the Prussians in 1742. It was occupied by the French in 1805, and Napoleon made it his headquarters after the battle of Austerlitz. It was taken again by a division of the French army in 1809, when it suffered severely. In 1866 it was occupied by the Prussians. Pop. about 112,000.

Brunne, brün, **Robert of**, the name by which **ROBERT MANNING**, a monk of the order founded by St. Gilbert of Sempringham, is usually designated. His monastery was in Lincolnshire, near the modern town of Bourn, and he lived in the reigns of Edward II. and Edward III. His chief work is his 'Handlyng Synne,' a free and amplified translation into English verse of William of Waddington's 'Manuel des Pechiez,' with such judicious omissions and excellent additions as made his version much more entertaining than the original. The purpose of the book was to convey religious instruction to the people in the agreeable form of moral anecdotes. It is of great importance from the linguistic point of view, as one of our best landmarks in the transition from the early to the later Middle English. He also made a new version in octosyllabic rhyme of Wace's 'Brut d'Angleterre,' and added to it a popular translation of the French rhyming chronicle of Peter Langtoft of Bridlington. Robert deliberately wrote in English instead of French, in order to reach the common people, to give them the means "for to haf solace and gamen, in felauschip when tha sit samen (together)."

Brunnow, broo'nöff, **Philipp** (COUNT VON), Russian diplomatist: b. Dresden, 31 Aug. 1797; d. Darmstadt, 12 April 1875. He entered the Russian service in 1818. He was present in a civil capacity in the campaigns of 1828 and 1829 against the Turks, and in 1839 was sent on a special mission to London, where, in the following spring, he was accredited as permanent ambassador. In this capacity he soon acquired distinction as a diplomatist. After retiring from London on the outbreak of the Crimean war, in 1854, he represented Russia in Frankfort, and, together with Count Orloff, was sent to the Conference of Paris in 1856. He was afterward

appointed to the court of Prussia; but in 1858 he returned to his old place in London, where he represented Russia at the conferences in 1864 and 1871. He was raised to the rank of count in 1871, and in 1874 retired to Darmstadt.

Bru'no, St., the name of two saints of the Roman Catholic Church.

1. The apostle of Prussia: b. about 970; d. 1008. He entered the order of St. Benedict and accompanied St. Adalbert on his mission to Prussia. He was appointed chaplain to the emperor, Henry II., and was a zealous missionary in Poland, Russia, and Hungary. Having been taken by the pagans of Lithuania, he had his hands and feet cut off, and was afterward beheaded.

2. The founder of the Carthusian order: b. Cologne about 1030; d. Della Torre, Calabria, 1101. He was educated in the school of the collegiate church of St. Cunibert, in which he afterward received a canonship, and then studied at Rheims, where he so distinguished himself that Bishop Gervais appointed him to superintend all the schools of the district. He attracted many distinguished scholars, and among others Odo, afterward Pope Urban II. Subsequently he was offered the bishopric of Rheims, but the immorality of his times induced him to go into solitude. In 1084 or 1086 he repaired with six friends of a like disposition to a narrow, bleak valley, called Chartreuse, about 15 miles from Grenoble, where they built an oratory and separate cells, and founded one of the severest orders of monks, named from their location Carthusians. In the meantime Urban II. became Pope, and in 1089 invited his former instructor to his court. Bruno reluctantly obeyed, but refused every spiritual dignity, and in 1094 received permission to found a second Carthusian establishment in the solitude of Della Torre, in Calabria, where he died. Leo X., by whom he was beatified, in 1514, permitted the Carthusians to celebrate a mass in honor of him; and Gregory XV., who ordered the process of his canonization, in 1623 extended it to the whole Roman Catholic Church.

Bruno, Giordano, jôr-dā'nô broo'nô, Italian philosopher: b. Nola, Naples, about 1550; d. Rome, 16 Feb. 1600. He entered the order of Dominicans and became distinguished by the originality and poetical boldness of his speculations. In 1580, probably on account of the persecutions which he drew upon himself by his religious doubts and his satires on the monks he was forced to take refuge at Geneva. Here, however, he was soon persecuted by the Calvinists for his paradoxes and his violence. In 1583 he stood forth at Paris as the antagonist of the Aristotelian philosophy, and as teacher of the *ars Lulliana*. His disputes with the Aristotelians caused him to leave Paris, and he then went to London, where he published several of his works, and to Oxford, where he taught for a short time. In 1585 he went by way of Paris and Marburg to Wittenberg, and from 1586 to 1588 taught his philosophy there. He then went to Helmstadt, where, protected by Duke Julius of Wolfenbüttel, he remained till 1589. He was then engaged at Frankfort-on-the-Main with the publication of some works, particularly 'De Monade, Numero, et Figura,' but left this city in 1592, and returned to Italy. He remained

BRUNO THE GREAT—BRUNSWICK

peacefully in Padua until 1598, when the inquisition of Venice arrested him and transferred him to Rome. After an imprisonment of six years, that he might have opportunity to retract his doctrines, he was burned for apostasy, heresy, and violation of his monastic vows. This death, which he might have averted eight days before by a recantation, he suffered with fortitude. While his violent attacks on the prevailing doctrines of the Aristotelian philosophy, and on the narrow-minded Aristotelians themselves, everywhere created him enemies, his rashness and pride threw him into the hands of his executioners. His philosophical writings, which have become very rare, display a classical cultivation of mind, a deep insight into the spirit of ancient philosophy, wit, and satire, as well as a profound knowledge of mathematics and natural philosophy. In 1585 appeared at Paris his famous 'Spaccio della Bestia Trionfante' (a moral allegory, with many satirical strokes on his own times); also his work 'Della Causa, Principio ed Uno' (Venice and London 1584); besides 'Del Infinito, Universo, e Mondi.' The former contains the foundation, the latter the application of metaphysics to the natural world. The doctrine is a pure Pantheism, connected with very peculiar notions of God—*Deus est monadum monas, nempe entium entitas*—a more complete Pantheistical system than had been previously exhibited, and which, since his time, Spinoza only—who, like Descartes, borrowed his ideas—has reduced to a more systematic form. The notion that God is the soul of the universe, and the world endowed with organization and life, might have been forgiven by his contemporaries; but his inference that the world is infinite and immeasurable, and his doctrine of the plurality of worlds, at the moment when the new system of Copernicus was attacked from all quarters, could not but be looked upon as a crime. His writings are mostly in the form of dialogues, without any methodical order. His language is a strange mixture of Italian and Latin. His style is violent and fiery. The originality and loftiness of his ideas take a powerful hold on those who can understand him. His logical writings, in which he boldly and skilfully applies Raymond Lully's art of topical memory, are more obscure and less interesting. His belief in magic and astrology, notwithstanding his enlightened views of the nature of things, is to be attributed to the spirit of his age. He also wrote poems, among others, 'Degli Eroiici Furori,' and a satirical comedy, 'Il Candelajo.' A collection of his Italian works by Wagner appeared at Leipsic in 1830. A biography by Domenico Berti (Florence 1868), is of special interest and importance on account of the new papers it brings to light regarding the official examination of Bruno before the Inquisition of Venice.

Bruno the Great, German ecclesiastic: b. 925; d. Rheims, 11 Oct. 965. He was the Archbishop of Cologne, third son of Henry the Fowler, and brother of the Emperor Otho I. He had a great share in the events of his time, and surpassed all the contemporary bishops in talents and knowledge. He was made Archbishop of Cologne in 953, and Duke of Lorraine in 954, and had much trouble in bringing into due subjection his unruly subjects. A numerous train of learned men from all countries, even from Greece, continually followed him, and his

excellent example was imitated by many prelates. Commentaries on the five books of Moses, and the biographies of some saints, are ascribed to him.

Brunonian Theory, an hypothesis framed by Dr. John Brown, 1735-88 (q.v.), according to which the living system was regarded as an organized machine endowed with excitability, kept up by a variety of external or internal stimuli, that excitability constituting life. Diseases were divided into sthenic or asthenic, the former from accumulated and the latter from exhausted excitability. Darwin, author of the 'Zoonomia,' adopted the theory with enthusiasm, and Rasori introduced it into Italy, where it flourished for a time, and then had to be abandoned, as it ultimately was everywhere.

Brunswick, Ferdinand, Duke of, German soldier: b. Wolfenbüttel, 11 Jan. 1721; d. Brunswick, 3 July 1792. He was the fourth son of Duke Ferdinand Albert, and was educated for the military profession. In 1739 he entered the Prussian service, was engaged in the Silesian wars, and became one of the most eminent generals in the Seven Years' War (q.v.). He commanded the allied army in Westphalia, where, always opposed to superior forces, he displayed superior talents. He drove the French from Lower Saxony, Hesse, and Westphalia, and was victorious in the two great battles of Crefeld and Minden. After the peace he resigned his commission on account of a misunderstanding with the king. From that time he lived at Brunswick, the patron of art and literature.

Brunswick, Friedrich Wilhelm, Duke of, German soldier: b. 9. Oct. 1771; d. Quatre Bras, 16 June 1815. He was the fourth and youngest son of Duke Karl Wilhelm Ferdinand of Brunswick (q.v.). He was educated for the army, and in 1786 was appointed by the king of Prussia successor of his uncle, Frederick Augustus, Duke of Oels and Bernstadt. He then went to Lausanne, remained two years in Switzerland, and upon his return was made captain in a Prussian regiment of foot. During the war against France in 1792 and the following year he fought in the Prussian armies and was twice wounded. In 1806 he took part in the war against France with all the fire which the oppression of Germany and his father's unhappy fate had kindled in him. He finally joined the corps of Blücher, and was made prisoner with him at Lübeck. On the death of his eldest brother he would have succeeded to the dukedom, as his other brothers were incapacitated by disease, but Napoleon prohibited his succession. He raised a free corps in Bohemia to operate against the French, but though he gained a victory over 4,000 Westphalians he was unable to make an effectual stand on the Continent. He embarked his troops for England, landed in 1809, and was received with enthusiasm. His corps immediately entered the British service, and was afterward employed in Portugal and Spain. The Parliament granted him a pension of £6,000 until he returned to his hereditary dominions, 22 Dec. 1813. The events of 1815 called him again to arms, and he fell at Quatre Bras.

Brunswick, House of, a royal German house, the true founder of which was Albert Azo II., Marquis of Reggio and Modena, a descendant, by the female line, of Charlemagne, who had also extensive domains in Lombardy,

BRUNSWICK-LUNEBURG

and in 1047 married Cunigunda, heiress of the Counts of Altorf, and thus united the two houses of Este and Guelph. The previous history of the Este family is uncertain. Guelph, the son of Azo, was created Duke of Bavaria, in 1071. He married Judith of Flanders, who was descended from Alfred the Great of England. The most powerful of this line was Henry the Proud, who succeeded in 1125, and by his marriage with the daughter of Lotharius II. acquired Brunswick and Saxony. Brunswick ultimately fell to a younger branch of the family, and Otho, the great-grandson of Henry by this branch, was the first who bore the title of Duke of Brunswick (1235). John, eldest son of Otho, founded the house of Lüneburg. Albert the Great, a younger son of Otho, conquered Wolfenbüttel, and on his death (1278) his three sons divided his dominions. Henry founded the house of Grubenhagen, Albert became Duke of Brunswick, and William Duke of Brunswick-Wolfenbüttel. Henry Julius, of this last branch, inherited Grubenhagen (1596). Ernest of Zell, of the second branch, who succeeded (1532), conquered the territories of Wolfenbüttel, and left two sons, by whom the family was divided into the two branches of Brunswick-Wolfenbüttel (II.) or Brunswick-Lüneburg, and Brunswick-Hanover from the latter of which comes the present royal family of Great Britain. The former was the German family in possession of the duchy of Brunswick down to 1884, when this line became extinct on the death of the last duke, Wilhelm I., who ascended the throne of the duchy in 1831. Ernest Augustus, of the Brunswick-Hanover House, was created Elector of Hanover in 1692. He married Sophia, daughter of Elizabeth, the daughter of James I. of England. Their son George succeeded his father as Elector of Hanover in 1698, and was called to the throne of Great Britain as George I. in 1714, under the Act of Settlement of 1701, which invested the succession in the heirs of the Princess Sophia, being Protestants. The British sovereigns continued to rule Hanover till the accession of Victoria, when the Duke of Cumberland succeeded. The present Duke of Cumberland, titular Duke of Brunswick and king of Hanover, would have become ruler of Brunswick but for the events which transferred Hanover to Prussia; and Prince Albert of Prussia was elected regent of Brunswick instead.

Brunswick-Lüneburg, Karl Wilhelm Ferdinand (DUKE OF), German soldier: b. (eldest son of the reigning duke, Charles of Brunswick, and of a sister of Frederick the Great) 9 Oct. 1735; d. Ottensen, near Altona, 10 Nov. 1806. He was carefully educated, and his military ambition was early kindled by the achievements of Frederick II. He commanded the Brunswick troops in the allied army in the Seven Years' war, and in the fatal battle at Hastenbeck, 28 July 1757, he recaptured a battery that had been taken by the French; calling forth from Frederick a statement that "he showed that nature had destined him for a hero." He was instrumental in deciding the victory of Crefeld. He took the most active part in all the enterprises of his uncle Ferdinand; and Frederick's esteem for him continued to increase. In 1764 he married the Princess Augusta of England. He practised the greatest economy, living mostly retired from public business, and devoted to

the arts and sciences. In 1773 he entered the Prussian service and became general of infantry, but had no opportunity of displaying his military talents. After the death of his father (1780) he entered upon the government with zeal and activity. Anxious for the improvement of the finances, he diminished his household, discharged the debts of the state, encouraged agriculture, extended the liberty of commerce, undertook or assisted in the erection of considerable buildings, and by causing Italian operas, masquerades, etc., to be exhibited gratis, provided also for the amusement of the public. Yet, with the best intentions, he was often unsuccessful. This was the case with his plans for the improvement of public education. He invited men of learning into the country at great expense, but the projected reformation having met with innumerable obstacles, they became a burden to the state. In 1787 he commanded a Prussian army for the support of the stadtholder of Holland. When the wars of the French Revolution broke out, he received the chief command of the Austrian and Prussian army, and issued at Coblenz, 15 July 1792, a manifesto, drawn up in a very haughty style, which did more injury to the allied forces than a hostile army could have done. The duke designed to press forward from Lorraine to Paris to cut off its supplies, and thus force it to surrender by famine. Longwy was taken, 23 August, and Verdun, 2 Sept. 1792. But in Champagne, a country of itself unproductive, the transport of provisions for the army from the frontiers was rendered difficult by mountains and forests. Dumouriez was encamped in the vicinity of St. Menchould, and skirmishes took place daily; but the skilful dispositions of Dumouriez culminated in the defeat of the Germans by Kellermann at Valmy, 20 Sept. 1792, and Brunswick-Lüneburg was obliged to conclude an armistice and evacuate Champagne. Custines took Worms and Spire during this retreat, and captured the fortress of Mainz, 21 October, and soon afterward Frankfort, which latter city, however, was retaken by the Prussians and Hessians, 2 December. The endeavors of the Germans, therefore, were principally directed to the recapture of those places. To this end the Duke, in conjunction with the Austrians, opened the campaign on the upper Rhine, in 1793, took the fortress of Königstein 7 March, conquered Mainz 22 July, and prepared to attack the strong fortress of Landau, then in the power of the French. The French, on the other hand, 14 September, made a general attack on the Duke and Wurmser, from Strasburg to Saarbrück. On that day the Duke had a sanguinary engagement with Moreau in the vicinity of Pirmasens, a town belonging to the landgraviate of Hesse-Darmstadt. The French were driven from their camp near the village of Hornbach as far as the Saar. A month later the Duke, having formed a union with Wurmser, succeeded, 13 October, in his attack on the lines of Weissenburg and his attempt to draw nearer to Landau. In order to gain another strong point of support he ventured, on the night of 16 November to make an assault upon the mountain-fortress of Bitche, which is the key of the Vosges, as the roads from Landau, Pirmasens, Weissenburg, and Strasburg unite at that place. This attempt miscarried. Between the 28th and the 30th of November, however, he defeated

BRUNSWICK—BRUNTON

a division of the army of the Moselle at Lautern, which was pressing through the mountains, under the command of Hoche, with the intention of relieving Landau. But the daily attacks of Hoche and Pichegru, without regard to the sacrifice of men, and the successful attempt of the latter to break the Austrian lines near Fraschweiler, 22 December, forced the Austrians to retreat beyond the Rhine, and occasioned the retreat of the Duke also. As some difficulties had already risen between Austria and Prussia, he laid down the chief command of the army in the beginning of the year 1794. The Duke continued to labor for the welfare of his country until 1806. Although now of such an age that he might have retired without reproach from public life, yet he assumed burdens beyond his powers. At the beginning of the year 1806, commissioned by the king of Prussia, he made a journey to St. Petersburg relative to the war that soon broke out with France. He was then placed at the head of the Prussian army. But his physical strength was not equal to his moral energy, as was proved by the battles of Jena and Auerstädt, in the latter of which he was mortally wounded.

Brunswick, Ga., a city and county-seat of Glynn County, situated on St. Simon's Sound, eight miles from the Atlantic Ocean; on the Plant System and the Southern R.R.'s; 80 miles south-southwest of Savannah. Its settlement dates back more than 100 years, and its importance as a commercial port has been developed since the close of the Civil War. It has an admirable and spacious harbor, provided with a brick lighthouse; is connected with New York, Fernandina, and Savannah by regular steamship lines; and exports large quantities of cotton, phosphates, tar, turpentine, and pine lumber. The city is the seat of a U. S. marine hospital and is a popular summer and winter resort, with fine hotels. Pop. (1910) 10,182.

Brunswick (Ger., BRAUNSCHWEIG), Germany, a duchy and sovereign state in the north-west part of the Germanic empire, comprising an area of 1,425 square miles. It is divided into eight districts—three larger and five smaller, detached from each other and surrounded by foreign possessions. About one half of the land is arable. Of the cultivated area of Brunswick 75 per cent belongs to private persons, 14 per cent to corporations, and 11 per cent to the state. The minerals are of some importance, including iron, lead, copper, some gold and silver, salt, asphalt, peat; besides marble, granite, sandstone, and other kinds of stone. The forests cover a considerable area, and over 72 per cent of this is in the hands of the state. The most important cultivated crops are grain, flax, hops, tobacco, potatoes, the sugar-beet, and fruits. A good deal of attention has been given in recent times to the improvement of the breeds of cattle, sheep, and horses. The industrial occupations are varied if not individually important, and embrace beet-root sugar, tobacco and cigars, paper, glass, flax, jute, and woolen goods, hats, wooden wares, chemicals, porcelain, sewing and other machines, lacquered wares, sal-ammoniac, chicory, and madder. The lacquered wares and porcelain of Brunswick are famous even in foreign countries. Brunswick, the capital, is the centre of trade. In 1806 the duchy was annexed by Napoleon to the kingdom of

Westphalia, but its native prince, Frederick William, was restored in 1813. In the German Confederation Brunswick held the 13th rank, with two votes in the Assembly and one along with Nassau in the Diet. It was afterward a member of the North German Union, formed after the dissolution of the old confederation by the victories of Prussia in the short campaign of 1866. As a state of the German empire it now sends two members to the Bundesrath and three deputies to the Reichstag. In its internal government Brunswick is a constitutional monarchy. The Representative Assembly consists of 21 deputies of the principal taxpayers, 10 of towns, 12 of communes, and 3 of the clergy. The estimated revenue and expenditure for 1910-11 were respectively \$3,746,400 and \$3,869,350; the debt, \$11,886,315; reserve fund, \$10,086,885. The prevailing religion is the Lutheran.

Brunswick, Germany, capital of the duchy of the same name (q.v.), situated on the Ocker, and on the railway from Hanover to Berlin. It was formerly one of the free cities of Germany, but it is now subject to the duke, and has been the ducal residence since 1754. The principal buildings are the new ducal palace, the mint, the house in which the Diet assembles, the town-house, the arsenal, the cathedral, museum, and picture gallery, and the public wine cellars. The ramparts of the old fortifications have been levelled and formed into a promenade. The older streets are narrow and tortuous, and antiquated in appearance. The Collegium Carolinum was founded in 1745, and intended as a medium between the common schools and the universities. It has enjoyed a high reputation even in foreign countries, particularly in England and Russia. The principal manufactures are wool, yarn, linen, porcelain, pasteboard, paper-hangings, and chemical preparations. There is a large commerce in grain, woolens, and manufactured articles. The traffic in home produce, and the carrying trade, have been much increased by the system of railways. The Brunswick fairs, though now declining, were formerly of great importance. Pop. about 117,000.

Brunswick, Me., a town in Cumberland County, situated on the right bank of the Androscoggin, 26 miles northeast of Portland; pop. of township in 1891, 6,012. The falls of the Androscoggin afford excellent seats for several mills and manufactories. Bowdoin College (q.v.) is located here, and connected with it is the Medical School of Maine, established in 1820. Pop. (1910) 6,621.

Brunswick Black, a quick-drying varnish, made of turpentine, asphaltum, and linseed oil. It is used as a lacquer for roughly coating finished iron work, and also in the preparation of microscopic slides.

Brunswick Green, a green pigment, prepared by exposing copper turnings to the action of hydrochloric acid in the open air. It is a pale bluish-green, insoluble, cupric oxychloride, $\text{CuCl}_2 \cdot 3\text{CuO} \cdot 4\text{H}_2\text{O}$. It derives its name from Brunswick, Germany, where it was first made by Gravenhorst.

Brunton, Mary (BALFOUR), Scotch novelist: b. Burra Island, in the Orkneys, 1778; d. 1818. In her 20th year she married Dr. Alexander Brunton, minister at Bolton, near Hadding-

BRUSH — BRUSSELS

ton; afterward at Edinburgh. She wrote 'Discipline' and 'Self-Control,' two novels which met with favor. At her death she left 'Emmeline,' a tale, and other pieces, which were published by Dr. Brunton, with a biographical sketch.

Brush, Charles Francis, American scientist: b. Euclid, Ohio, 17 March 1849. He graduated at the University of Michigan in 1869. He invented the modern arc system of electric lighting and founded the Brush Electric Company. He was decorated by the French government in 1881 for his achievements in electrical science. In 1891 he won a long contest in the Federal courts over the rights to the manufacture and sale of storage batteries; and in 1900 he was awarded the Rumford medal by the American Academy of Arts and Sciences.

Brush, Edward N., American physician: b. Glenwood, Erie County, N. Y., 23 April 1852. He was educated at the University of Buffalo, edited the 'Buffalo Medical Journal' (1874-89), and was assistant in the State Lunatic Asylum at Utica, 1878-84, and in the Pennsylvania Hospital for the Insane at Philadelphia, 1884-91. In the year last named he became physician-in-chief of the Shepard and Enoch Pratt Hospital, Baltimore. He has written much upon the subject of insanity and was associate editor of the 'American Journal of Insanity' 1878-84, and also from 1897.

Brush, George De Forest, American artist: b. Shelbyville, Tenn., 28 Sept. 1855. He studied under Gérôme in Paris and first attracted attention by his pictures of Indian life. His later work is almost entirely figure composition. He exhibited 'The Artist,' and 'Mother and Child,' at the Paris Exhibition of 1900, and received its gold medal. He is a member of the Society of American Artists and an associate of the National Academy of Design.

Brush, George Jarvis, American mineralogist: b. Brooklyn, N. Y., 15 Dec. 1831. He received a public school education and graduated at Yale, where he studied science in 1852. He subsequently studied in Germany. Since 1855 he has held professorships at Yale—that of metallurgy down to 1864, and that of mineralogy since that date. He has been a leading official of the Sheffield Scientific School since 1864. His writings on mineralogy are authoritative.

Brush, an instrument used for painting, or for removing dirt by light rubbing, from floors, furniture, etc. They are generally made of hair, bristles, whalebone, or of various vegetable fibres, and are divided into two classes—simple and compound. Simple brushes are composed of a single tuft, and compound brushes consist of several tufts inserted in a handle. Painters' brushes are examples of the former, and ordinary hair brushes of the latter.

Brush-bird. The scrub-bird (q.v.) of Australia.

Brush-grass (*Andropogon gryllus*), a grass of South Europe, with stiff wiry roots which are used for making brushes.

Brush-turkey, a mound-building game-bird of Australia, *Catheturus lathamii*. See MEGAPODES.

Brus'sa, or **Brous'sa**, Asia Minor, a Turkish city, and capital of the vilayet of Khodavendikyar, situated in a fertile and finely wooded plain, which is enclosed by the ridges of Olympus, and abounds in hot, sulphurous and chalybeate springs, which are much frequented. A railway runs between Brussa and Mudania, its port, on the Sea of Marmora. The inhabitants are Turks, Greeks, Armenians, and Jews, engaged in commerce, in the culture of the vine, and in the manufacture of carpets, gauze, etc. A considerable number of persons are employed in mulberry culture, the reeling of silk, and silk manufacture, Brussa silks being in great demand throughout the Orient, though much raw silk is sent to Lyons to be manufactured. Caravans passing from Aleppo and Smyrna to Constantinople promote the commerce of the town. Before the earthquake of 1855 it contained close upon 150 mosques, and was adorned with an immense number of fountains; but from the earthquake and a terrible conflagration the former splendor of the town suffered greatly. It is a picturesque and interesting place, however, gardens, groves, and streams of running water being interspersed among the buildings. The castle, which is about a mile in circumference, is supposed to represent the Prusa of the ancients. Brussa was long the capital of Bithynia, and one of the most flourishing towns in the Greek empire of Constantinople. In 1326 it was taken by Orkhan, son of Othman, founder of the Ottoman dynasties; and from that epoch it was the residence of the Turkish sovereigns until the seat of empire was transferred to Adrianople. Pop. about 76,000.

Brussels (Flem. BRUSSEL; Fr. BRUXELLES), of the province of South Brabant, Belgium, a city of which it is the capital, and also the capital of the country. It is situated on the small river Senne, about 50 miles southeast of the German Ocean; lat. 50° 51' N.; lon. 4° 22' E. Brussels is built partly on the acclivity of a hill, partly on the plain, in a country agreeably diversified by sloping heights. Like many other Continental towns whose political situation has changed, its old fortifications have been transformed into boulevards. These surround the older portion of the city, extending for nearly five miles; they are planted with elms and linden trees in four rows, and form a wide and agreeable promenade commanding an extensive view of the surrounding country. The numerous gates, most of which bear the names of the principal high roads or railways which traverse the kingdom, are nearly all modern, but the Porte de Hal, built in 1379, is a remnant of the ancient fortifications, a large military tower of remarkable construction, which in later days was long used as a prison. The city now extends far beyond the boulevards. The Senne enters it by two branches, great part of one of these being now covered over. The stream is not navigable, but Brussels possesses water communication by means of canals with Charleroi, Mechlin, Antwerp, and the ocean. In many quarters within the boulevards Brussels still presents a series of twisted streets. That part of the upper or new town inside the boulevards, which contains the royal palace, is the principal exception. The suburbs, outside the boulevards, especially in the upper town, are large, and have recently greatly increased. The principal are the

BRUSSELS CONFERENCE

Quartier Leopold and the Quartier Louise, which are regularly and elegantly built. The principal buildings of the new town are the king's palace, the palace of the chambers, the palace of justice (a magnificent new building of colossal proportions in the classical style), the palace of the fine arts, the public library and museum, etc. The upper town is ornamented with a fine park of 17 acres, with fountains and statues, around which most of the principal buildings are situated. The lower town is rich in ancient architecture. The hôtel de ville (built 1401-55), one of the finest municipal buildings in Belgium, is an imposing Gothic structure with a spire 364 feet high. The square in front of it is perhaps the most interesting of all the public places of Brussels. The cathedral of St. Gudule is the finest of many fine churches, richly adorned with sculptures and paintings. It was founded in 1010, and its reconstruction, commenced in 1226, was carried on till the 17th century. The churches of Notre-Dame-de-la-Chapelle and Notre-Dame-des-Victoires are also edifices of great beauty. The monuments of Brussels, and the specimens of painting and sculpture with which its public buildings are adorned, are too numerous to mention.

The manufactures and trade of Brussels are greatly promoted both by its canal communications and by the network of Belgian railways. Printing, type-founding, and all the other departments of bookmaking give employment to a large section of the population. Until 1852 the reprinting of French contemporary works was extensively carried on, but in that year a treaty with France gave protection to works of literature and art. Lace was an ancient manufacture, and is still of some importance; the printing of cotton and woolen fabrics, muslins, etc., and many minor manufactures are carried on. Brussels carpets are chiefly made at Tournai, but some are manufactured in the city. There are breweries, distilleries, sugar refineries, foundries of iron and brass, steam engine factories, etc. The trade carried on by the canals and railways is that of a capital city and manufacturing town, for the supply of internal wants and the distribution of its own products. The languages spoken in Brussels are French, and Flemish or Dutch, the former principally spoken in the new town, the latter chiefly in the old. English is also a good deal spoken, owing to the number of English residents and visitors.

The scientific, literary, artistic, and benevolent institutions of Brussels comprise a free university, founded in 1834, a proprietary institution, with about 60 professors and assistants, comprising four faculties, mathematical and physical sciences, belles-lettres, law, and medicine; a school of geography, founded in 1830, with an extensive museum, embracing geology, chemistry, and natural history; one of the finest observatories in Europe, the Belgian Royal Academy of Sciences, Letters, and Fine Arts, and the Royal Academy of Fine Arts; the public library, containing 350,000 volumes and 30,000 valuable manuscripts; the picture gallery, with the finest specimens of Flemish art; the Royal School of Medicine; many institutions for elementary education; societies of horticulture and other natural sciences; several hospitals; an infirmary; a philanthropic society, etc.

During the Middle Ages Brussels did not attain the extent or importance of several other cities of the Low Countries. The Emperor Otho dated a decree from Brussels in 976. It was walled by Baldric, Count of Louvain, in 1044. It was more completely fortified in 1380, the wall then following nearly the line of the present boulevard. During the 15th century it was twice burned and once ravaged by the plague. It was the scene, in 1568, of the execution of Counts Egmont and Horn. It was bombarded and burned by the French in 1695, and was the headquarters of Marlborough after the battle of Ramilies. It was taken by the French in 1794, and retained till 1814, when it became the chief town of the department of the Dyle. From 1815 to 1830 it was one of the capitals of the kingdom of the Netherlands, and in 1830 it was the chief centre of the revolt which separated Belgium from Holland. Since then it has been the capital of the Belgian kingdom, and one of the centres of European civilization, being especially distinguished, far beyond its relative importance, for the cultivation and patronage of art. The population of Brussels, including the suburbs, 1 Jan. 1909, was 637,807. The foreign element is prominent, especially the French.

Brussels Conference, the current name of two abortive international conferences: one on the usages of war, July-August 1874; the second on bimetalism, in the autumn of 1892.

1. The harsh treatment of prisoners and non-combatants in the Franco-German war aroused a humane feeling in protest. At the Congress of Universal Alliance in Paris, June 1872, a Society for the Improvement of the Condition of Prisoners of War was formed, which sent a circular to the chief European powers asking them to appoint delegates to a congress on this subject at Paris. England and France declined, because the request came from no official source; but Russia substituted a project of her own, and Gortchakoff invited the powers to a conference at Brussels, ostensibly to lay before them a proposal for "a code to determine the laws and usages of warfare, and to limit the consequences and diminish the calamities consequent upon war, as far as it may be possible or desirable." England, however, sent but one delegate, the United States none, and the South American states were refused any share. To the dismay of the promoters, the meeting was at once turned into an engine for the exact reverse of their intentions. The dominating force throughout was that of Germany and Russia, whose views and purposes were identical; and it soon became clear that the real object of the call was to strengthen their hands as militant states by throwing overboard the entire fabric of international law on the obligations of humanity, and substituting the baldest assertion of the naked rights of irresponsible force. The original topic of prisoners of war, when brought up, was refused discussion by the Russian delegate, Jomini, on the ground that the governments did not wish to hamper themselves. The question of revising the articles of the Geneva Convention (q.v.) on the treatment of the sick and wounded, and the neutrality of clergymen, physicians, etc., attending them, was also thrown out by him, on the ground that for military reasons it was necessary to revise the whole convention, and that the states "most apt in the

BRUSSELS LACE—BRUSSELS SPROUTS

initiative of war" should have the right to "insist on their necessities." The question of what constitutes "effective occupation" was still more vital. The obvious interest of aggressive states was to insist, as did Germany, that it "need not manifest itself by visible signs," so that a town once occupied should still be considered so even if the troops were removed, and any rising of the inhabitants be punishable as treason; and that it was sufficiently established by "flying columns," or as defined by a satiric German, "three Uhlans and a trumpet." This denial of all rights of self-defense against invasion was almost unanimously rejected by the other delegates, however; and the principle substituted that there must be actual occupation by adequate force, and lines of communication kept open; that it "exists only when the territory is placed actually under authority of the hostile army, extends only to the territory where such authority is established, and exists only so long as the belligerent is able to exercise it." The right of *levee en masse*, or armed insurrection of the body of a people, is linked with this; and naturally the states itching for conquest wished to confine belligerent rights to regularly enrolled armies, and oblige the rest of the people to submit when these are defeated. Of course no such rule adopted by the belligerents themselves would ever bind a people who wanted to rise, but it would form a plea for much political murder before it was repealed. Jomini said that war had so changed its nature in modern times that it was necessary to "regulate the inspirations of patriotism," for fear they might be "more disastrous to the country itself than to the oppressor"; and that "those grand explosions of patriotism which took place in the beginning of the century cannot continue to occur in our day, at least not in the same form." On this head it was proposed that any inhabitant of a country under occupation who should give information to the "enemy" (his own people) should be handed over to "justice." But this philanthropic repression of self-defense in its own interest, and outlawry of the means by which Prussia gained her own independence, was not agreed to. All these assaults on natural right were opposed by the British delegate. An attempt was made to discuss reprisals or retaliation, but it was refused. Restriction of bombardment of the interior of towns without harming the fortifications was sought, but flatly refused by Germany and Russia, on the ground that "experience had shown it (the bombardment) to be one of the most efficient means of securing the objects of a war," which is true of sack, massacre, and other things banned by civilization. Finally a proposal was made that, at the option of the belligerent, neutrals should be obliged to receive and care for (at the belligerent's expense) the wounded; in other words, that a strong power could make its neutral neighbors depots to keep its armies in condition.

2. The change in relations between gold and silver, which has produced so much financial and political demoralization in the last quarter century, was the subject of three international conferences within that time; at Paris, August 1878 and April 1881, and at Brussels, November 1892. The last named was called by President Harrison for both business and political reasons. The accumulation of silver under the Sherman

Act of 1890 was threatening the country with a fall to the single silver standard, only averted by the bond sales of 1893 and the repeal of the act; and the free-coinage movement which convulsed the country in 1896 was making headway, had been approved by the platform on which Harrison was elected, and demanded some recognition. Abroad, the recent adoption of the gold standard by state after state was raising gold to a premium, and arousing the fear that it was too scarce for the sole money of ultimate payment; the fall in silver was causing much loss and dislocation of trade, and many believed that its demonetization was the sole cause of this, and of the low price of commodities (which they called the high price of gold), and that its restoration by common agreement would raise its price again and restore equilibrium of commerce. The call was accepted by all the European states and Mexico, 20 with the United States; and all the 50 delegates were present, but those of Germany, Austria, and Russia were forbidden to debate or vote. The president was Montefiore Levi, of Belgium; vice-president Edwin H. Terrell, United States minister to Belgium. The United States delegation drew up the order of business, and offered a resolution that "it is desirable that some means should be found for increasing the use of silver in the currency systems of the nations," and, while stating their own belief in general bimetallicism, suggested two plans short of this, to which Mr. Alfred Rothschild, of the British delegation, added a third. The resolution was favored by most of the delegations, who indeed would not otherwise have been sent there; but was too general to be of any service, and was laid on the table and not taken up. A special committee reported on the three schemes before it: (1) That of A. Soetbeer, too involved for international agreement; (2) Rothschild's, as altered in committee, essentially, that all Europe should buy 30,000,000 ounces of silver yearly, the United States to keep on buying 54,000,000; unlimited free coinage to be established in British India and Mexico; the agreement to run for five years unless silver rose to an agreed price before that; (3) Moritz Levy's, laid before the conference of 1881, to withdraw from circulation all gold coin and notes under 20 francs. The British delegation refused to support this unless joined with something like the Rothschild plan of maintaining the gold price of silver; the Latin Union members would not have this because it involved fresh purchases of silver; nor the United States, because of its unfairness to us; and Rothschild withdrew his plan. Thereupon the conference began discussing bimetallicism till they adjourned, 15 December, for the holidays, to reconvene the following May if the governments thought it advisable; but the election of President Cleveland meantime had taken it out of the immediate political field as an adjunct, and it did not meet again. See INTERNATIONAL LAW; U. S., DIPLOMACY OF THE

Brussels Lace. See LACE.

Brussels Sprouts, a garden vegetable (*Brassica oleracea* var. *gemmifera*), derived from the same species as cabbage and cauliflower, like which it is cultivated as an autumn crop more widely in Europe than in America.

BRUT—BRUTUS

Brut, Roman de, a poem in eight-syllable verse, composed by Robert Wace, but indirectly modeled upon a legendary chronicle of Brittany, entitled 'Brut y Brenhined' (Brutus of Brittany), discovered in Armorica by Walter, archdeacon of Oxford, and translated into Latin by Geoffrey of Monmouth. Wace presented his poem to Eleonore of Guyenne in 1155, and it was translated into Anglo-Saxon by Layamon.

The poem relates that after the capture of Troy by the Greeks, Æneas came to Italy with his son, Ascanius, and espoused Lavinia, daughter of King Latinus; she duly presented a son to him. This son, as well as Ascanius, succeeded to the throne, which devolved at last upon Silvius, son of Ascanius, who became the father of Brutus, from whom the 'Roman' takes its name. Brutus slew his father with a misdirected arrow, and fled. First he went to Greece, where he delivered the Trojan captives; next he conquered the Armorican Isles, to which he gave the name of Britain. Afterward he made war upon the king of Poitou and founded the city of Tours, which he named in honor of his son. From Poitou he returned to the Armorican Isles, overcoming the giants in possession, and renamed it Britain. He founded the city of London and reigned long and gloriously there.

The narrative now concerns itself with the descendants of Brutus. The adventures of Lear, of Belin, of Brennus who voyaged to Italy, of Cassivellaunus who so bravely resisted Cæsar, of all the bellicose chiefs who opposed the dominion of the Roman emperors, are minutely related. King Arthur, however, is the real hero of the 'Roman de Brut.' Arthur performs prodigies of valor, is the ideal knight of his order of the Round Table, and finally departs for some unknown region, where it is implied he becomes immortal, and never desists from the performance of deeds of valor. In this portion of the narrative figure the enchanter Merlin; the Holy Grail, or chalice in which were caught the last drops of the Saviour's blood as he was taken from the cross; Lancelot of the Lake; Tristan and his unhallowed love; Perceval and his quest of the Holy Grail. The 'Roman' became unprecedentedly popular, and it was publicly read at the court of the Norman kings.

Brütt, Ferdinand, German painter: b. Hamburg, 13 July 1849. He was educated at the Weimar art school and settled in Düsseldorf in 1876; was professor at the art school there in 1893; and in 1900 went to Cronberg. The subjects of his earlier pictures were from the life of the modern peasants or from the history of the 18th century, but in later years he has painted scenes from the life of the city. His works include: 'Peasant Delegation'; 'The Prince on the Promenade'; 'At the Exchange'; 'In the Art Gallery.'

Bruttii, an ancient people of Italy, living in the southwestern peninsula, now Calabria. The Greeks had several flourishing colonies on the coast and had to some extent conquered the inhabitants of the interior; the Lucanians also made themselves masters of some portions of the interior. But about 350 the people revolted, and, assisted by the Lucanians, gained their independence and captured several Greek cities. At this time they were called by the Greeks Bruttii (rebels). They remained independent till they

united with Pyrrhus against Rome and were subdued by the Romans in 272 B.C. In the second Punic war they sided with Hannibal, and after his expulsion from Italy were heavily punished by the Romans, robbed of considerable of their territory, entirely deprived of their independence, and not allowed to bear arms.

Brutus, or **Brute**, in the fabulous history of Britain, the first king of the island, according to Geoffrey of Monmouth. He is said to have been the son of Silvius, and grandson of Ascanius, the son of Æneas, and to have been born in Italy. He landed at Totness, in Devonshire, destroyed the giants who then inhabited Albion, and called the island from his own name. At his death the island was divided among his three sons: Lochrine had England, Cumber Wales, and Albanact Scotland.

Brutus, Decimus Junius, Roman soldier: d. 43 B.C. He served under Cæsar in the Gallic war, and in the civil war he commanded the fleet destined to besiege Massilia. Cæsar afterward appointed him to the government of further Gaul. Nevertheless he joined the conspiracy against Cæsar, and volunteered, on the memorable Ides of March, to conduct his friend and benefactor to the place of slaughter. When the tragedy was consummated, Decimus Brutus retired to Cisalpine Gaul, and there maintained himself for some time, but was ultimately deserted by his troops, betrayed to Antony, and put to death by order of that general.

Brutus, Lucius Junius, a Roman patriot, sometimes called the Elder, to distinguish him from Marcus Junius, the slayer of Cæsar, lived about 500 B.C. According to the legend, he was the son of Marcus Junius and the elder daughter of Tarquin the Proud, the last king of Rome, and is represented as having saved his life from the cruelty of that prince by feigning idocy, whence he received the surname of Brutus (Stupid). Yet the king associated him with his own sons, Aruns and Titus, in a mission which he sent to Delphi to inquire into the meaning of a portent, which had caused much alarm at Rome. After receiving the reply to the question they were charged to propound, the young men enquired of the oracle which of the three should be king in Rome, no one of them being, it is observable, heir to that dignity. To this the reply was, "Whichever shall first kiss his mother." So, on their return to Italy, Titus and Aruns ran to kiss the queen mother; but Lucius Junius, as he landed from the galley, pretending to slip, fell prostrate and kissed the soil of Rome, in the belief that by "mother" the oracle had meant mother earth. When Lucretia, the wife of Collatinus, plunged a dagger into her bosom that she might not outlive the insult which she had suffered from Sextus, the son of Tarquin, Brutus is said to have drawn the dagger from the wound, and to have sworn vengeance against the Tarquins whose banishment he then demanded and procured. Then (about 509 B.C.) he is said to have been chosen one of the two first consuls. According to the legend, a conspiracy to restore the monarchy having been supported by the two sons of Brutus, he, after the crime had been proved, ordered the lictors to execute the law, and did not leave the assembly till after the execution. At length Tarquin marched against Rome. The consuls advanced to meet him. Brutus led the cavalry; Aruna,

BRUTUS—BRYANT

son of Tarquin, commanded the body opposed to him. They pierced each other with their spears at the same moment, and both fell. The Romans conquered, and Brutus was buried with great splendor. The details of the story of Brutus, which may be regarded as a poetical legend, have been shown by Niebuhr to be irreconcilable with history.

Brutus, Marcus Junius, Roman republican: b. 85 B.C.; d. 42 B.C. He was the son of that Marcus Junius Brutus whom Pompey caused to be murdered, and of Servilia, the half sister of Cato. He lost his father when he was only eight years old, but his mother and uncles carefully directed his education. On the outbreak of the civil war he followed the example of Cato, and joined the Pompeians, notwithstanding his aversion to their leader. After the unfortunate battle of Pharsalia, he surrendered himself to Cæsar, who received him generously, allowed him to withdraw from the war, made him in the following year governor of Cisalpine Gaul, and afterward conferred on him the government of Macedonia. Notwithstanding these benefits, Brutus allowed himself to be drawn by Cassius and others into the conspiracy against Cæsar, who had now made himself master of the supreme power in the state. Cæsar was assassinated in the senate house. In public speeches Brutus explained the reasons of this deed, but he could not appease the dissatisfaction of the people, and retired with his party to the capitol. Antony succeeded in exciting the popular indignation against the murderers of Cæsar, and they were compelled to flee from Rome. Brutus went to Athens, raised a large force, and also gained over the troops in Macedonia. Thus, master of all Greece and Macedonia, he stood at the head of a powerful army. He went to Asia and joined Cassius, whose forces were also strong. At Philippi they fought the army of Antony and Octavius. Cassius was beaten by Antony, and caused himself to be killed. Brutus repulsed Octavius, by whom, however, he was soon afterward totally defeated. Seeing his cause ruined, he ended his life by falling upon his sword. Brutus was a man of little independent judgment, a mere student, liable to be swayed by others, and he was in no sense a martyr to a genuine patriotism. He was the author of philosophical and historical treatises, orations, etc., none of which now survive.

Bruyas, Jacques, zhāk brü-yā, French Jesuit: b. 1637; d. 1712. In 1666 on coming to Canada he went as a missionary to the Iroquois, and later established one of the earliest missions among the Mohawk Indians. He was a student of their language, and wrote in Latin a valuable work on the 'Mohawk Radicals.'

Bruyère, Jean de la, zhõn dé la brü yâr. See LA BRUYÈRE.

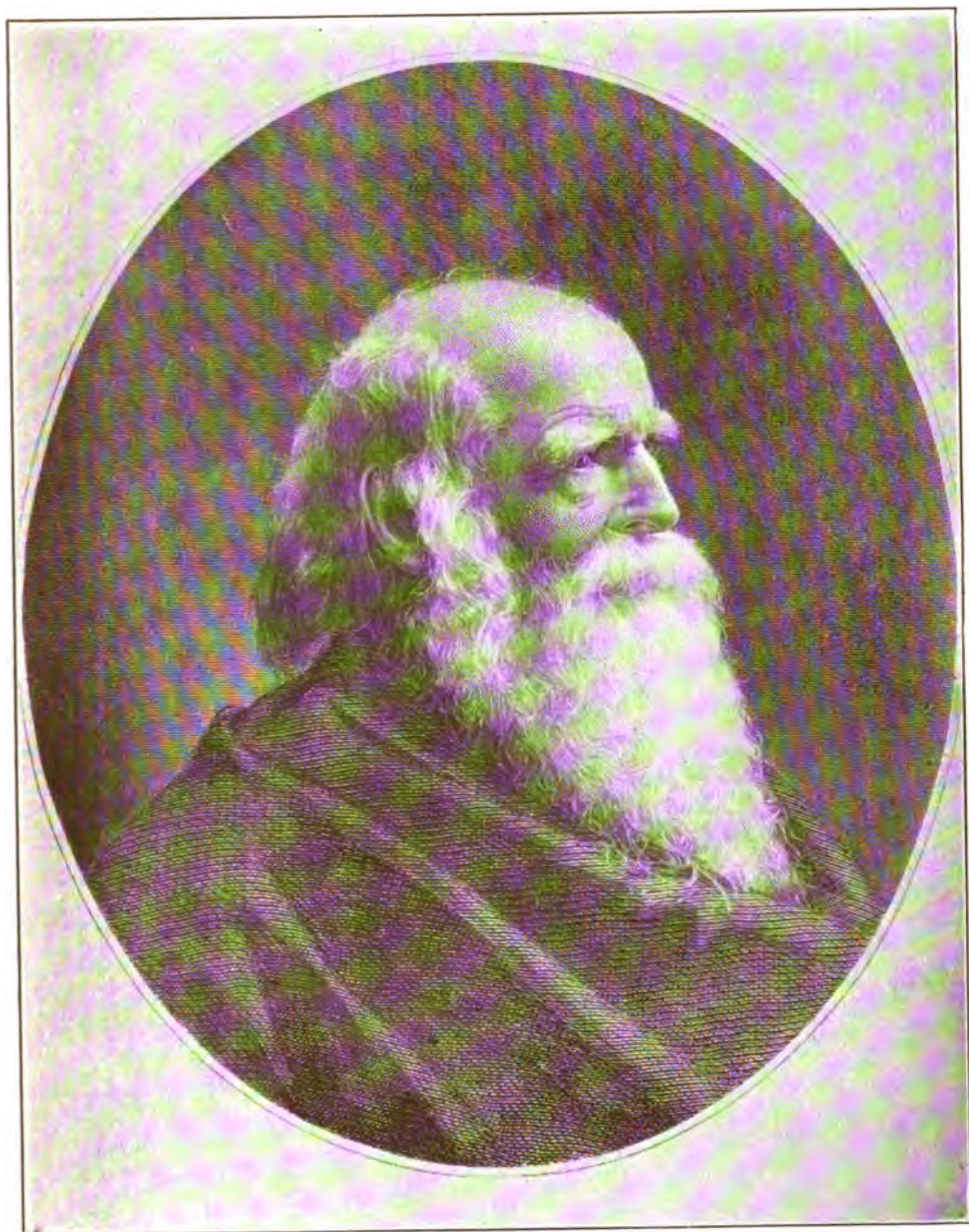
Bruyn, Barthel, bār'tël broin, German painter: b. Cologne, 1493; d. about 1556. His earlier works show the influence of some of the German masters, but later he imitated Michael Angelo and other Italian painters. His masterpiece is the altarpiece for the Church of St. Victor at Xanten. His numerous works are mostly in Cologne and Munich; among them are: 'Martyrdom of St. Ursula'; 'Adoration of the Magi'; 'Corpus Christi'; 'Saint Catherine'; and a number of portraits.

Bryan, Mary Edwards, American author: b. Jefferson County, Florida, 1844. She began writing at an early age, and before the war was a regular contributor to the 'Southern Field and Fireside,' and other journals. Her published books are: 'Manch' (1879); 'Wild Work' (1881), a story of Louisiana reconstruction; 'The Bayou Bride'; 'Kildee' (1886); 'Uncle Ned's White Child'; 'Ruth, an Outcast'; 'His Legal Wife'; 'The Girl He Bought'; 'My Own Sin'; 'His Wife's Friend.'

Bryan, William Jennings, American political leader: b. Salem, Ill., 19 March 1860. He was graduated at Illinois College, Jacksonville, in 1881, and at the Union College of Law, Chicago, in 1883. He practised law at Jacksonville from 1883 to 1887, when he removed to Lincoln, Neb. He was elected to Congress in 1890, and again in 1892. From 1894 to 1896 he was editor of the Omaha *World-Herald*. In 1896 he was nominated for President by the Democratic National Convention at Chicago, and also by the People's party and Free Silver Republicans, on a platform demanding the free and unlimited coinage of silver by the United States at a ratio of 16 to 1, regardless of the action of other nations, a financial policy which he had for some time advocated with much earnestness and eloquence of both tongue and pen. He was defeated at the polls by McKinley. During the war with Spain, he was colonel of a Nebraska regiment of volunteers, but saw no field service. In 1900 he was a presidential candidate, of the Democrats, Populists, and Free-Silver Republicans, upon an anti-imperialistic and anti-trust platform, with a reiterated demand for free-silver. He was again defeated by William McKinley. Soon after the election he established *The Commoner*, a political weekly. In 1908 he was again the Democratic candidate for President, and received 162 electoral votes, against 321 for Wm. H. Taft. He wrote 'The First Battle: a Story of the Campaign of 1896' (1896), which contains some of his speeches and a biographical sketch by his wife; 'Under Other Flags' (1904); 'The Old World and Its Ways' (1907).

Bryant, Edwin Eustace, American lawyer and author: b. Milton, Vt., 10 Jan. 1835; d. Toronto, Can., 1903; educated at the New Hampton Institute; removed to Wisconsin 1858. He served in the Civil War and from 1868-72 was private and executive secretary to the governor of Wisconsin. In 1878 he was elected to the legislature of the State; in 1882 was adjutant-general of Wisconsin, and from 1885-89, assistant United States attorney-general for the post-office.

Bryant, Henry Grier, American explorer and geographer: b. Allegheny City, Pa., 7 Nov. 1859. He graduated at Princeton, 1883, and from the law department of the University of Pennsylvania, 1886. He has contributed literary articles to various magazines and encyclopædias. In 1891 he organized and conducted an exploring expedition to the Grand Falls of Labrador, was second in command of the Peary Relief Expedition in 1892, and in 1897 led an exploring expedition to the Mount Saint Elias region of Alaska. In 1895 and 1897 he was a delegate to international geographical congresses in London and Berlin.



WILLIAM CULLEN BRYANT.

BRYANT—BRYCE

Bryant, Jacob, English philologist and antiquary: b. Plymouth, 1715; d. 1804. He studied at Eton and King's College, Cambridge, became afterward tutor of the sons of the famous Duke of Marlborough, the eldest of whom he also accompanied to the Continent as his secretary. After his return he received, by the influence of his patron, a lucrative post in the ordnance, which gave him leisure for his researches into Biblical, Roman, and Grecian antiquities. His most important work is the 'New System of Ancient Mythology' (1774-6). He was engaged in a famous dispute on the veracity of Homer and the existence of Troy, in which he endeavored to show that there never was such a city as Troy, and that the whole expedition of the Greeks was a mere fiction of Homer. The object of one of his earlier treatises, which appeared in 1767, is to show that the island Melita, on which Saint Paul was wrecked, was not Malta, but situated in the Adriatic. He endeavored to illustrate the Scriptures by explanations drawn from Josephus, from Philo the Jew, and from Justin Martyr; but in this, as in all his writings, his learning and his ingenuity are misled by his love of controversy and paradox.

Bryant, John Howard, American poet: b. Cummington, Mass., 22 July 1807; d. Princeton, Ill., 14 Jan. 1902. He was a brother of William Cullen Bryant (q.v.). He studied at the Rensselaer Polytechnic Institute, Troy, N. Y., removed to Illinois in 1831, and from 1832 until his death lived on his farm at Princeton, performing the greater part of its work with his own hands. He held numerous local offices, served in the State legislature in 1842, and 1858; was a Free-soil candidate for Congress in 1854; and a delegate to the convention which organized the Republican party in 1856. He was an intimate friend of Abraham Lincoln, who appointed him collector of internal revenue for the Fifth Illinois district, 1862-6. The poems which were the product of his leisure hours show him as a lover of nature, which he described minutely and effectively, and a man of refined tastes and kindly feelings. His first printed poem, 'My Native Village,' appeared in the 'United States Review and Literary Gazette' in 1826, his brother William then being editor of that journal. His collected work may be found in 'Poems' (1855), and 'Poems Written from Youth to Old Age, 1824-84,' privately printed at Princeton, Ill., in 1885.

Bryant, Neil, American actor and minstrel performer: b. Keesville, N. Y., 1835; d. Brooklyn, N. Y., 6 March 1902. He was the youngest of three brothers, long prominent in the negro minstrel entertainment business. He made his first appearance on the minstrel stage in 1845, and soon became the champion American flute-player. With his brothers he opened a theatre at 472 Broadway, New York, in 1857, which they retained for 10 years. The oldest brother having died in 1867, the others continued in the same business in other locations in New York, but after the death of the second brother in 1875, Neil became unsuccessful and lost the most of what he had acquired. He retired from the stage in 1883 and was subsequently employed in the coast survey.

Bryant, William Cullen, American poet and journalist: b. Cummington, Mass., 3 Nov.

1794; d. New York, 12 June 1878. His father, Dr. Peter Bryant, a physician, was a man of much literary culture, as well as large experience in public affairs. He prepared, when he was but 14, a collection of poems, which were published in Boston in 1809. In that volume appeared 'The Embargo,' the only poem dealing with the politics of the day he ever wrote. In the following year Bryant entered Williams College as a student of law, but left without taking a degree in 1815, when he was admitted to the bar. In that year he became a contributor to the 'North American Review,' in which appeared the following year his 'Thanatopsis,' a poem in blank verse, which from the first has commanded profound admiration. Six years later he published a second collection of poems, which brought him into a wide fame. The principal piece, 'The Ages,' is a didactic poem, in which he sketches the past progress of the world, concluding with a glowing picture of America, and its occupation by the new race. He definitely abandoned law for literature in 1825, and went to New York, where he founded the 'New York Review,' and a year after became the editor of the *Evening Post*, an old established paper with which he was connected till his death. In 1832 he issued another collection of poems, which was republished in Great Britain with a preface by Washington Irving. In the summer of 1834, accompanied by his family, he went to Europe, and traveled through England, France, Germany, and Italy, remaining in the latter country for a considerable time. In 1845 he again visited Europe, and still again in 1849, when he extended his journey to Egypt and the Holy Land. The incidents of these and subsequent travels, both in Europe and America, were described in letters written to the *Evening Post*, which were reprinted in separate volumes, entitled 'Letters of a Traveler,' and 'Letters from Spain and Other Countries.' A complete edition of his poems up to 1855 was published in that year, and in 1863 appeared a small volume entitled 'Thirty Poems.' His last works of importance are his translations of the 'Iliad' (1870) and the 'Odyssey' (1872), translations which many American critics rank above any that had hitherto appeared in the English language. Early in 1878 appeared 'The Flood of Years,' his last poem of any great length, in which the poet, in strains that remind the reader of 'Thanatopsis,' reviews the life of man as the ridge of a wave ever hurrying on to oblivion the forms that appear on its surface but for a moment, concluding, however, with the expression of a confident hope in the future of mankind, even though the present is most dark and drear. At the time of his death he was engaged, in conjunction with Sydney Howard Gay, on a popular history of the United States, the first volume of which appeared in 1876.

Bryaxis, Greek sculptor: flourished in the 4th century B.C. He cast a statue in bronze of Seleucus, king of Syria, and assisted in adorning the mausoleum with bas-reliefs. He also executed five gigantic statues at Rhodes, a statue of Pasiphaë, and other works. According to Clemens Alexandrinus, two of his statues were attributed by some to the celebrated Phidias.

Bryce, George, Canadian clergyman and educator: b. Mount Pleasant, Ontario, 22 April 1844. He was graduated at the University of

Toronto in 1867, and was ordained to the Presbyterian ministry in 1871. His great work was the foundation of Manitoba College and in assisting the foundation of Manitoba University. He has written: 'Manitoba, Its Infancy, Growth, and Present Condition' (1882); 'A Short History of the Canadian People' (1886); and 'Canada and the Northwest' (1887).

Bryce, James, British historian and politician: b. Belfast, 10 May 1838. His father, James Bryce, LL.D., was a Scotchman, well known as a distinguished teacher and geologist, and a master in the high school of Glasgow from 1846 to 1874. He received his early education at the high school and University of Glasgow, and latterly at Trinity College, Oxford, where he graduated B.A. with a double first-class in 1862, being in the same year elected a Fellow of Oriel College. In 1867 he became a barrister of Lincoln's Inn. From 1870 till his resignation in 1893, he was regius professor of civil law at Oxford. He entered Parliament in 1880 as member for the Tower Hamlets division of London, and since 1885 he has represented South Aberdeen as a Liberal and Home Ruler. He was chancellor of the duchy of Lancaster and a member of the cabinet in the Liberal ministry of 1892, and two years later he became president of the Board of Trade, a post which he held till the change of government ensuing upon the general election of 1895. In 1905 he became Chief Secretary for Ireland and in December 1906 ambassador to the United States. He is D.C.L. of Oxford, LL.D. of Edinburgh and Glasgow; in 1894 he was elected a Fellow of the Royal Society, and many foreign honors have been conferred on him. His two most important works are: 'The Holy Roman Empire' (1864, afterward enlarged and republished) and 'The American Commonwealth' (1888), a very full exposition of the American Constitution, system of government, and administration, political machinery, etc. He has also written: 'Transcaucasia and Ararat' (1877); 'Impressions of South Africa' (1897); and 'Studies in History and Jurisprudence' (1901).

Bryce, Lloyd, American editor and novelist: b. Long Island, N. Y., 1852. From 1889 to 1896 he was editor of the 'North American Review.' His works include: 'Paradise'; 'A Dream of Conquest'; 'The Romance of An Alter Ego'; 'Friends in Exile'; 'The Literary Duet.'

Bryden, Henry Anderson, English author: b. 3 May 1854. He was educated at Cheltenham College, and later studied for the bar. In early life he won a national reputation as an athlete, especially as runner. His travels in South Africa have been extensive. Among his books are: 'Kloof and Karroo: Sport, Legend, and Natural History in Cape Colony'; 'Gun and Camera in Southern Africa'; 'Tales of South Africa'; 'The Victorian Era in South Africa'; 'Nature and Sport in South Africa'; 'An Exiled Scot' (1899); 'Animals of Africa' (1900); 'History of South Africa' (1904); 'Big Game Shooting' (1905).

Brymner, Douglas, Canadian archivist: b. Greenock, Scotland, 1823. Trained for a mercantile career, he was engaged in business until 1856, when ill health compelled his retirement. He emigrated to Canada in 1857, and engaged in journalism, becoming editor of the Presbyterian and associate editor of the Montreal *Herald*.

In 1872 he was appointed historical archivist of Canada, and for 30 years labored tirelessly in collecting and arranging the historical records and documents of the Dominion. His series of annual reports, each entitled 'Report on the Canadian Archives,' constitute a rich treasury of original documents for every phase of Dominion history.

Bryn Mawr College, an educational institution for women, at Bryn Mawr, Pa.; founded in 1880 by Joseph Taylor. Its standard of admission is very high; its system of undergraduate studies combines required courses and varied elective groups. At the end of 1910 it reported: Professors and instructors, 60; students, 425; volumes in the library, 60,000; productive funds, \$1,734,000; income, \$250,776; benefactions, \$707,500.

Bryony (*Bryonia*), a genus of seven climbing perennial herbs of the natural order *Cucurbitaceae*, natives of Europe and Asia. Common bryony (*B. dioica*), which attains a height of from 6 to 12 feet, has long, white, branching, ill-smelling, fleshy roots, one half inch thick; five-lobed roundish leaves; racemes of staminate flowers and axillary, greenish-white, pistillate, short-stemmed flowers in corymbs, followed by red berries as large as peas. Probably because of its repulsive odor the plant has been reputed as poisonous, but is used to some extent medicinally. The young shoots of this and the following species are often used like spinach. Common bryony is frequently planted for ornament in Europe, but like its relatives has not become very popular in the United States for this purpose. White bryony (*B. alba*) attains a height of from 6 to 12 feet, has thick, yellowish tuberculate roots, long-stemmed leaves and long-stemmed pistillate flowers in racemose corymbs. Abyssinian bryony (*B. abyssiniana*), which by some botanists is considered a species of the genus *Coccinia*, yields edible roots. Black bryony (*Tamus communis*), belongs to the natural order *Dioscoreaceae*.

Bryophyllum, a small genus of succulent herbs of the natural order *Crassulaceae*, natives of warm climates. *B. calycinum*, the only species cultivated in greenhouses, is a native of the Maluccas and Mexico. It is two to four feet high with reddish stems, fleshy leaves, and compound panicles of pendulous flowers. Both calyx and corolla are reddish green and cylindrical, the former about an inch long, the latter two inches or more. The plant is specially interesting since the leaves when laid on damp sand or moss or placed in moist air, produce new plants from the notches in their margins. In Bermuda, where they are called "flopers," in some of the West Indian islands, and parts of the southern United States, the plant is a weed in fence rows, upon stone walls, etc., and sometimes a pest in fields. Its leaves are said to be tart in the morning, tasteless at noon, and bitterest in the evening, from the absorption of oxygen at night and its release in daylight.

Bryozoa, the name given by Ehrenberg to a class of mollusoid animals, the peculiarities of which had been previously observed by J. V. Thompson, who had called them polyzoa. See POLYZOA.

Brzesc Litewski, b-zetch li-tëff'ski, or **Brest Litovskiy**, Russia, a fortified town in the government of Grodno, on the right bank of

BUA — BUBONIC PLAGUE

the river Bug, about 110 miles south of Grodno. It was formerly the capital of a Lithuanian palatinate, and contains an old castle, a high school, three churches, and a synagogue, and has a considerable transit trade. It is at the junction of railroads from Odessa to Königsberg and Moscow to Warsaw, and two fairs are held here annually. In 1794 Suwaroff gained here a victory over the Poles. Pop. about 46,500.

Bua, boo'a, a small island in the Adriatic, belonging to the Dalmatian district of Spalatro, Austro-Hungary; is connected with the town of Trau by a bridge. During the latter period of the Roman empire many political offenders and heretics were confined here. It contains six villages, of which Santa Croce, or Bua, is the principal. The productions of the island comprise dates, wine, olives, and particularly asphaltum, of which there is a remarkable well.

Buache, Philippe, fê-lêp bü-âsh, French geographer: b. Paris, 7 Feb. 1700; d. 24 Jan. 1773. He spent seven years in arranging a new repository of maps and charts. In 1729 he became chief geographer to the king, and in the following year a member of the academy of sciences, in which he had been the means of instituting a professorship of geography. His notions of geography were in some respects peculiar. He asserted that there was a vast continent about the South Pole, traversed by lofty mountains and gigantic rivers. The suggestion, that at Bering Strait a connection between Asia and America might be traced, came from him. He published 'Considerations géographiques et Physiques sur les Nouvelles Découvertes au nord de la Grande Mer' (1753); 'Atlas Physique' (1754).

Buansuah, boo-an-soo', a wild dog (*Cyon primævus*), found throughout India, especially in the forests along the foothills of the Himalayan Mountains. It is smaller than a wolf, but similar in habits, and reddish in color. It hunts in companies, and a pack of these dogs is able to overcome any of the wild beasts in the jungle, except the elephant and rhinoceros, but they are very shy of mankind. It is generally known in the south as the dhole. See DOG.

Bubach. See INSECT POWDER.

Bu'balis or **Bubale**, a North African antelope (*Alcelaphus bubalinus*), thought to be the bubalus of the ancients. It is one of the hart-beests (q.v.), and equals a large stag in size, with an ox-like head and muzzle, and lyrate horn, heavily ringed. It is bay in color, with a black tuft on the end of the tail.

Bubas'tia, or **Bubastus**, a city of ancient Egypt, now in ruins; mentioned in the Old Testament as Pi-Beseth, now known as Tel-Basta; situated in the delta of the Nile, southwest of Tanis; was built in honor of the goddess Pasht, called by the Greeks Bubastis. This goddess was represented by the figure of a cat, and many mummied cats have been found in the tombs of Bubastis. On the north side of the city began the canal between the Nile and the Red Sea, constructed by Pharaoh Neco. Bubastis was taken by the Persians 352 B.C., and its walls dismantled. Among the ruins of this city have been found remains of costly and magnificent temples. Here were celebrated solemn feasts to the goddess Pasht,

attended by people from all parts of Egypt, even to the number of 700,000 at one time, as is stated by Herodotus.

Bubble Shell, the thin, inflated bubble-like shell of a gastropod mollusk (*Bulla*), the shell usually without a spire. On each side of the head is a large swimming flap (epipodium), and one species flits about in shallow pools on mud flats. Our eastern Atlantic coast species are *Bulla occidentalis* and *Haminea solitaria*, the latter found in Vineyard Sound. They mostly live in rather deep water, at least below low-tide mark.

Bubna und Littitz, boob'na, lî-tîtz', **Ferdinand** (COUNT OF), Austrian field marshal: b. Zamersk, Bohemia, 1768; d. Milan, 6 June 1823. He was early in life, the chamberlain of the emperor of Austria, afterward entered the military service, and after distinguishing himself on various occasions, at Manheim, in the defense of Bohemia (1800), and at Austerlitz, gained at Wagram, in 1809, the rank of field-marshal-lieutenant. In the war of 1813 he commanded an Austrian division with much honor, was present at the battles of Lützen, Bautzen, Dresden, and Leipsic, and in 1814 received the chief command of the Austrian army which was to pass through Geneva to the south of France. He advanced upon Lyons, but was unsuccessful, till the corps of Bianchi and Hessen-Homburg came to his assistance. Bubna remained at Lyons till the return of the allied forces, and then retired to Vienna. After the landing of Napoleon in 1815, he again led a corps against Lyons, and in Savoy opposed Marshal Suchet, till Paris was conquered, and the marshal retreated beyond Lyons. He then took possession of Lyons without opposition, established a court-martial to punish the disturbers of public order, and proceeded with greater severity than on his former campaign. In September he marched back to Austria, and received for his services valuable estates in Bohemia from the emperor. In the insurrection of Piedmont, 1821, the Count de Bubna received the chief command of the Austrian troops destined to restore the ancient government. After the accomplishment of this commission, he was appointed general commandant of Lombardy.

Bu'bo, a genus of birds belonging to the family *Strigidae*, or owls. They have a small ear aperture, two large feathered tufts like horns on the sides of the head, and the legs feathered to the toes. *B. maximus* is the eagle owl, or great owl. It is a native of Europe. The corresponding American species is *B. virginianus*.

Bubo, a hardening and enlargement of lymphatic glands, generally the inguinal, as in the Oriental or Levantine plague, syphiloid gonorrhœa, etc., always, unless dissipated by medical interference, followed by suppuration. In cases of true infecting syphilis a suppurating bubo is a rare complication, although induration of the glands in the later forms of the disease is almost invariably present. See BUBONIC PLAGUE.

Bubonic Plague, a disease supposed to be identical with the plague known as the Black Death, which had its origin in China, and made its first appearance in Europe 543 A.D., at Constantinople. It derives its modern name from the fact that it attacks the lymphatic glands in the neck, armpits, groins, and other parts of

BUBONIC PLAGUE

the body. The swollen parts are extremely sensitive to the touch, the patient suffers from headache, vertigo, high fever, vomiting, and great prostration. Another feature is the appearance of purple spots and a mottling of the skin. In severe cases death generally ensues in 48 hours, and, at best, recovery is slow. It is now generally agreed that this plague is a germ disease. The bacillus has been identified by Indian bacteriologists as well as by European and American investigators. It is found without trouble in the blood of the patient, and cultures are made in beef tea or glycerine preparations. The bacilli resemble those of chicken pox, and are said not to survive more than four days of dessications. At the Hoagland laboratory in Brooklyn, N. Y., extensive experiments have been made, both in the culture of the germs and in an anti-toxin, by means of which immunity from this scourge may be obtained. The disease has been called "the poor's plague," from the fact that it first attacked the half-starved masses who congregate in the slums of the cities. This was the case in Bombay, where so fatal were its ravages that a panic ensued and more than 450,000 people, one half the population, left the city. Pure air, wholesome food, the free external use of cold water, and proper sanitary regulations modify to some extent the attacks of the plague, and, more than anything else, have been the cause of the comparative exemption of Europeans from it. It has, however, visited some of the cities of Europe.

History.—The first authentic description of the bubonic plague is contained in the writings of Rufus of Ephesus, who described the disease as having existed in northern Africa during the 3d or 4th century B.C. He presented the testimony of physicians of that period to corroborate his arguments. Since that time the disease has been variously described by writers under the name of Levantine, Oriental, and Bubonic Plague, and the black plague, or black death. These designations are more or less open to criticism and lack scientific foundation. In the reign of Justinian, 542 A.D., the disease appeared in Egypt, and within a year extended to Constantinople, where it is said to have caused the death of 10,000 persons in one day. In 1352 the plague spread through the whole of Europe and nearly one fourth of the population died. It is estimated by Hecker that during this reign of terror, out of 2,000,000 inhabitants of Norway, but 300,000 survived. It was estimated by Pope Clement VI. that the mortality from black death for the entire world was 40,000,000. This outbreak lasted about 20 years. During the great plague of London, in 1665, there were 63,596 deaths out of a population of 460,000. It was believed the infection was introduced by bales of merchandise from the Levant. The sanitary condition of London, at the time, was notoriously bad. It is a significant fact that those who lived out of town and on barges and ships on the Thames did not contract the disease.

Characteristics.—The bacillus of the bubonic plague was discovered and studied by Kitasato and Yersin, working independently, and at about the same time, in 1894, during the epidemic of the plague at Hong Kong. It is found in large numbers in the pus, in the lymphatic glands, and occasionally in the internal organs. It is apparently present in the blood only in the acute

hemorrhagic types of the disease, and shortly before death. An anti-plague serum injected into a young Chinaman at the Catholic mission at Canton in June 1896, who was attacked with a severe type of the disease, was effective. It is believed the plague is transmitted solely through infection from previous cases. What part, if any, the soil plays in propagating the disease has not been settled. The natives of Eastern countries are strongly impressed with the belief that the germ is contained in the ground. Exactly what influence the climate and temperature have in the propagation of the plague is not known. It is apparent, however, that hot, dry air is fatal to the disease, and that moist, warm air is favorable to it. It even may be very active in cold weather. This was shown by the outbreak that occurred on the Volga River, in Russia, in the severe winter of 1878. Like typhus fever, the plague is unknown in the tropics, and, like typhus, again, usually selects its victims from the lowest class, and thrives on filth and famine. The usual period of incubation is from three to six days. In the usual or severe forms, the earlier symptoms are similar to those that usher in typhus fever. The invasion is abrupt, associated with chills, great depression, blunted condition of the intellect, pains in the bones and high fever. Death frequently occurs within 48 hours, and even earlier. When life is prolonged for five or six days the prognosis is more favorable. The germ can be carried in rags, general merchandise and clothing. Rigid quarantine with disinfection of all articles should be strictly enforced when it appears in any country.

Remedies.—The chief causes of the plague are famine and filth. Serums seem to be unavailable against these obstacles, as is even the use of antipyretics or stimulants. As a preventive serum, that of Prof. Haffkins has proven the most effectual. See SERUM THERAPY. The compulsory evacuation of infected cities and districts has accomplished much. Indeed, this was the most available remedy during the epidemic in the Punjab district in 1896-7, and is the first preventive of a spread in case of an outbreak. The cities of India lie close to the river, the same being sacred, and the population multiplying upon their banks. As the river bottoms prevent proper drainage this militates largely in favor of the disease. The miserable "chawli," or huts, of the natives, squat low on the alluvial soil, which absorbs all drainage and gives out pestilential gases. The Hindu has little or no vitality to battle with the disease. His state of demoralization makes a livelihood impossible, and famine fosters the plague. The Mohammedans, unlike the Hindus, do not burn their dead bodies; nor like the Parsees, place them in the Towers of Silence, on Malabar Hill, to be eaten by the vultures. By burying in shallow graves, they aid the spread of the disease, contaminating all underground supplies of water.

Animals also spread the plague. Mice, rats, cats, and monkeys have been known to infect a ship and bring the scourge from a foreign port. Excessive precautions are taken at all ports leading from Asia, that of the Suez Canal being the most dangerous and carefully guarded highway into Europe. Every ship and, indeed, every passenger and piece of baggage is scrutinized, with a view to discovering the first symptoms of the plague in the victim or suspicious article of

BUCARAMANGA — BUCCANEERS

merchandise that may lead to infection. Precautions, however, are quite impossible in the incipient stages of the disease, as the evidences may not appear in the victim till he or she is already marked for death. Fever, swelling of the lymphatic glands, and utter prostration are soon superseded by the appearance of the bubos in groin, neck, and face, when death occurs in 90 cases out of a possible 100, within a period varying from five hours to as many weeks, depending upon the constitution of the victim. The white races are more immune than any other. The mode of life in civilized countries is conducive to successful battle with the plague. As it is rather sporadic than epidemic, even in the East, there should be little fear of its securing a foothold on western soil. Two cases of the disease were brought into New York harbor, 18 Nov. 1899, from Santos, Brazil, on the British steamship *J. W. Taylor*. The infected vessel was refused a landing, but was placed in quarantine and steps instantly taken to make sure and complete the isolation of the disease. Health Officer Doty, of New York, announced that the chances of the bubonic plague reaching this country through the ports of New York were extremely remote. Active measures were also taken in the summer of 1900 to disinfect the Chinese quarter of San Francisco in which the plague had appeared. In Honolulu heroic measures were adopted to stamp out the infection.

Bucaramanga, boo-ka-ra-mān'ga, the capital of the department of Santander, in Colombia, South America, 185 miles north-northeast of Bogota. It is an important coffee centre, and in the neighborhood are mines of gold, copper, and iron. A United States consul is resident here. Pop. 16,000.

Bucareli y Urzua, Antonio Maria, ān-tō'-nē-ō mā-rē'a boo-cā-rā'lē ē ūrt-zoo'ā, Spanish soldier and administrator: b. Seville, 24 Jan. 1717; d. Mexico City, 9 April 1779. He was governor of Cuba in 1760-71, and viceroy of New Spain (Mexico) from 1771 till his death.

Buccaneer, *The*, a narrative poem by Richard Henry Dana. It was first published in 1827, and the scene of a portion of the work is laid in Block Island, Rhode Island.

Buccaneers', a name applied to various bands of English and French freebooters in America, whose exploits form a remarkable part of the history of the 17th century. The origin of these associations of buccaneers seems to have been the arrogant pretensions of the Spaniards to the dominion of the whole of America. The English and French settlers combining against them for mutual defense, acquired from their precarious life in the vicinity of the Spanish settlements, adventurous and lawless habits, and became ultimately, in some of the islands of the Caribbean Sea, little better than pirates. The earliest association of this kind began about 1525, but they afterward assumed greater magnitude. After the assassination of Henry IV. in France in 1610, several Frenchmen sought a residence on the island of St. Christopher, one of the Antilles. Driven thence in 1630, some of them fled to the western coast of San Domingo, others to the small island of Tortugas, in the vicinity. Several Englishmen, led by a similar disposition, associated themselves with the latter. The fugitives at San Domingo employed

themselves especially in the chase of wild cattle, of which there were large herds on the island. They sold the hides to the mariners who landed on the coast, and as they cured the flesh by smoking it before the fire, like the American savages, they were called buccaneers, from the Caribee *boucan*, a place for smoke-drying meat. These hunters lived in the rudest state of nature, enjoying in common all that they had taken in the chase or acquired by robbery. The Spaniards, who could not conquer them, determined to extirpate all the cattle on the island, and thus obliged the buccaneers either to cultivate the land as husbandmen, or to join the other freebooters on the island of Tortugas. These bold adventurers attacked, in small numbers and with small means, but with an intrepidity which bade defiance to danger, not only single merchant vessels, but several of them together, and sometimes armed ships. Their common mode of attack was by boarding. They directed their efforts especially against the Spanish ships which sailed for Europe laden with the treasures of America. By the repeated losses which they suffered, the Spaniards were at last so discouraged that they seldom offered a serious resistance. It happened once that a ship of the buccaneers fell in with two Spanish galleons, each of which had 60 cannon, and 1,500 men on board. To escape was impossible, and the pirates could not think of surrender. Their captain, Laurent, made a short speech to them, sent one of his men to the powder room with orders to set fire to it upon the first sign which he should give him, and then placed his men in order of battle on each side. "We must sail between the enemy's ships," cried he to his crew, "and fire upon them to the right and left." This manœuvre was executed with extraordinary rapidity. The fire of the pirate killed so many people on board both ships that the Spaniards were struck with a panic, and let him escape. The Spanish commander was afterward put to death on account of the disgrace which he had brought upon his nation. Their frequent losses greatly reduced the trade of the Spaniards with America. The buccaneers now began to land on the coast, and to plunder the cities. Their manner of dividing the booty was remarkable. Every one who had a share in the expedition swore that he had reserved nothing of the plunder. A false oath was of extremely rare occurrence, and was punished by banishment to an uninhabited island. The wounded first received their share, which was greater according to the severity of their wounds. The remainder was divided into equal parts, and distributed by lot. The leader received more than the others only when he had particularly distinguished himself. Those who had perished in the expedition were not forgotten. Their part was given to their relations or friends; and in default of them, to the poor and to the Church. Religion was strangely blended with their vices, and they began their enterprises with a prayer. The wealth acquired was spent in gambling and debauchery, for it was the principle of these adventurers to enjoy the present and not care for the future. The climate and their mode of life gradually diminished their number, and the vigorous measures of the British and French governments at last put an end to their outrages, which had, perhaps, been purposely tolerated. From this band of pirates arose the French set-

tlements on the western half of San Domingo. In the beginning of the 18th century the piracies of the buccaneers had entirely ceased. See Raynal, 'History of the Two Indies'; Burney, 'History of the Buccaneers'; Stockton, 'Buccaneers and Pirates of Our Coasts' (1898).

Buccari, book'ka-rē, or **Bakar**, an Austro-Hungarian free port on the Gulf of Quarnero, a few miles east of Fiume. It stands on the slope of a hill with a castle at the top, and its harbor, though small, is safe. Fishing, ship-building, and linen manufacturing are carried on here, the tunny fisheries being of the greatest importance. The wine of the district is also exported.

Buccinator, the trumpeter's muscle, one of the maxillary group of muscles of the cheek. They are the active agents in mastication. The buccinator circumscribes the cavity of the mouth and, aided by the tongue, keeps the food under the pressure of the teeth; it also helps to shorten the pharynx from before backward, and thus assists in deglutition.

Buccin'idæ, a family of mollusks belonging to the order *Prosobranchiata*, and the section *Siphonostomata*. They constitute part of Cuvier's *buccinoida*. They have the shell notched in front, or with the canal abruptly reflected so as to produce a varix on the front of the shell. The leading genera are *buccinum terebra*, *eburna*, *nassa*, *purpura*, *cassis*, *dolium*, *harpa*, and *oliva*. These shellfish are much valued as the source of the dye commonly called royal purple.

Buccinum, the typical genus of the family *Buccinidæ*. In English they are called whelks, which are not to be confounded with the periwinkle, also sometimes called whelk. *B. undatum* is the common whelk. Species of the genus exist in the cretaceous rocks, but it is essentially Tertiary and recent.

Buccleugh, bük-klü', the title (now a dukedom) of one of the oldest families in Scotland, tracing descent from Sir Richard le Scott in the reign of Alexander III. (latter half of the 13th century), and first becoming conspicuous in the person of the border chieftain Sir Walter Scott, of Branksholm and Buccleugh—the latter an estate in Selkirkshire. The son of Sir Walter, bearing the same name, was raised to the peerage, in 1606, as Lord Scott of Buccleugh, and his successor was made an Earl in 1619. In 1663 the titles and estates devolved upon Anne, daughter of the second Earl, who married the Duke of Monmouth, illegitimate son of Charles II., the pair, in 1673, being created Duke and Duchess of Buccleugh, etc. Subsequently the dukedom of Queensberry passed, by marriage, into the family. The sixth Duke of Buccleugh, William Henry Walter Montagu Douglas-Scott, succeeded to the title in 1884.

Bucen'taur, a mythological being, half man and half ox or ass. The splendid galley in which the Doge of Venice annually sailed over the Adriatic on Ascension Day also bore this name. Dropping a ring into the sea, he espoused it in the name of the republic, with the words, "Desponsamus te, mare, in signum veri perpetuæ domini." The custom originated in 1176, when the doge, having refused to deliver up the Pope, who had taken refuge in Ven-

ice, to the emperor, encountered and defeated the imperial fleet which was sent to reduce the Venetians.

Buceph'alus, the horse of Alexander the Great, which he bought for 13 talents (about \$5,000). Philonicus, a Thessalian, offered to sell him to King Philip; but Philip, who considered the price too great, commanded the unmanageable steed to be led away, when the young Alexander offered to mount him. He mounted accordingly, and to the astonishment of all, the horse obeyed him, and willingly submitted to his guidance, though he had never before obeyed a rider. Alexander, from this circumstance, conceived such an affection for him that he never rode upon any other horse; and Bucephalus also, when caparisoned for battle, suffered no other rider. He died of a wound, and Alexander caused him to be buried near the Hydaspes, and built over his grave a city, which he called Bucephala.

Bucer, bü'sér, or **Butzer**, **Martin**, German Protestant theologian: b. Schelestadt, Alsace, 11 Nov. 1491; d. Cambridge, 28 Feb. 1551. He entered the Dominican order in 1506, but in 1521 left the order, and became a convert to Lutheranism. He was at first preacher at the court of Frederick, the elector of the Palatinate, afterward in Strasburg, and at the same time professor in the university there for 20 years. He took part in the conference of Marburg with the hope of reconciling Luther and Zwinglius. In 1548 King Edward VI. of England, at the suggestion of Archbishop Cranmer, invited him to Cambridge, where he was professor of theology. In 1557 Queen Mary caused his bones to be burned. The Cardinal Contarini called him the most learned divine among the heretics. He wrote a commentary on the Psalms under the name of Aretius Filius, and many other works. See Baurn, 'Capito and Butzer' (1860); Tollin, 'Servet and Butzer' (1880); Mentz and Erichsen, 'Zur 400-jährigen Geburtsfeier Martin Butzer' (1891).

Buch, Leopold von, lä'ö-pöld fön boon, German geologist: b. Stolpe, Prussia, 26 April 1774; d. Berlin, 4 March 1853. He studied under the celebrated Werner in the mining school of Freiberg in Saxony, where Alexander von Humboldt was his fellow-student, and early began to distinguish himself by his geological writings. His first works were Descriptions of the Mineralogy of Landeck, and of the Geognosy of Silesia. Up to 1798 he had adopted the Neptunian theory of Werner, with some modifications; but now saw cause to abandon it, and to recognize the volcanic origin of the basalts. He saw Vesuvius for the first time in 1799; but afterward, in 1805, had an opportunity, along with Humboldt and Gay Lussac, of witnessing its actual eruption. In 1802 he examined the extinct volcanoes of Auvergne in the south of France. The results of all these geological travels were given to the world in a work entitled 'Observations During Travels in Germany and Italy' (1802-9). Indefatigable as an observer, Von Buch turned his steps from the south of France in 1806, and proceeding to Scandinavia spent two years in examining its physical constitution. This furnished the materials for his well-known work entitled 'Travels in Norway and Lapland.' In 1815 he visited the Canary Isles. These volcanic isles furnished

BUCHAN—BUCHANAN

the starting point from which Von Buch commenced a regular course of study on the production and activity of volcanoes. This is attested by his standard work on the subject, entitled 'Physical Description of the Canary Isles' (1825). On his return from the Canaries he visited the basaltic group of the Hebrides and the coasts of Scotland and Ireland. His geological excursions, even in countries which he had repeatedly visited before, continued without interruption at a very advanced age, till within a few months of his death. Alexander von Humboldt, who had known him intimately for a period of more than 60 years, called him the greatest geologist of our period. He was unmarried, and lived aloof from the world, entirely devoted to scientific pursuits. Besides the works already mentioned he was the author of many important tracts on paleontology, as, 'On the Ammonites' (1832); 'On the Terebratulæ' (1834); 'On the Ceratites' (1841); and 'On the Cystidæ' (1845). Another of his works not to be omitted is his 'Geological Map of Germany.'

Buchan, bük'än, Alexander, Scottish meteorologist: b. Kinnesswood, Kinross-shire, Scotland, 11 April 1829; d. 13 May 1907. He was a teacher in Edinburgh, 1848-60, becoming in the latter year secretary to the Scottish Meteorological Society and in 1878 curator of the library and museum of the Royal Society of Edinburgh. He published 'A Handy Book of Meteorology' (1867); 'Introductory Text-Book of Meteorology' (1871). He contributed to the Encyclopædia Britannica, 9th edition, the article on 'Meteorology.'

Buchan, David, English voyager and explorer: b. 1780; d. about 1837. He obtained a lieutenant's commission in the navy in 1806, and in 1810 his admiral, Sir John Duckworth, dispatched him to the river Exploits, for the purpose of exploring the interior and opening a communication with the natives. He reached the mouth of the river in January 1811, and with 34 men and 3 guides penetrated through the greatest difficulties 130 miles into the country. Buchan afterward became high sheriff of Newfoundland. On a subsequent expedition he was lost with his ship Upton Castle. In 1818 Buchan was appointed to the command of an Arctic expedition. The admiralty fitted out two expeditions that year—one to discover the northwest passage, the other to reach the North Pole. The Dorothea and Trent were the vessels selected for the second expedition, under Capt. Buchan and Lieut. (afterward Sir John) Franklin. Latitude 80° 34' N. was the most northerly point gained by this expedition.

Buchan, John, Scottish novelist: b. Perth, Scotland, 26 Aug. 1875. He was educated at Glasgow University and Brasenose College, Oxford. His published books include 'Sir Quixote' (1895); 'Musa Piscatrix' (1896); 'Scholar Gipsies' (1896); 'Sir Walter Raleigh' (1897); 'John Burnet of Barns' (1898); 'A History of Brasenose College' (1898); 'Grey Weather' (1899); 'A Lost Lady of Old Years' (1899); 'The Half-hearted' (1900); 'The Watcher by the Threshold' (1902).

Buchan, Elspeth (SIMPSON), Scottish religious enthusiast, founder of a sect: b. near Banff, 1738; d. near Dumfries, 1791. She was educated in the Scottish Episcopal Church, but

on her marriage to Robert Buchan, in Glasgow, became, like him, a burgher seceder. In 1779, or thereabout, she broached dogmas of her own, soon deserted her husband and moved to Irvine, where she made a number of converts, among them Mr. Hugh Whyte, a relief clergyman. In 1784, the people assaulted Mr. Whyte's house, which the Buchanites had made their tabernacle. They then, 46 persons in all, set up a sort of community at a farm-house 13 miles from Dumfries, waiting for the millennium or the day of judgment, fasting for weeks in the expectation that they would be fed like the young ravens that cry, and adjuring all fleshly vanities. A few left, accusing Mrs. Buchan of tyranny and dishonesty, but the majority of her votaries were faithful to her to the last. She called her disciples around her death-bed and communicated to them, as a secret, that she was the Virgin Mary, who had been wandering through the world since the Saviour's death, and that she was only going to sleep now, and would soon conduct them to the new Jerusalem. Her disciples, in the expectation of her re-appearance, refused to bury her until ordered by a justice of the peace. The sect became extinct in 1848. See BUCHANITES.

Buchan, William, Scottish physician: b. Ancrum, Roxburghshire, 1729; d. 1805. He commenced practice at Edinburgh, and having for a considerable time directed his attention to a digest of popular medical knowledge, published in 1769 his work entitled 'Domestic Medicine; or, the Family Physician,'—an attempt to render the medical art more generally useful by showing people what is in their own power, both with respect to the prevention and cure of diseases. It is constructed on a plan similar to that adopted by Tissot in his 'Avis au Peuple.' It appealed to the wants and wishes of so large a class of the community, that, considering it to have been the first work of the kind published in Britain, there is no wonder that it should have attained success. Before the death of the author 19 large editions had been sold. Duplanil of Paris, physician to the Count d'Artois (Charles X.), published a translation in five volumes, with notes, which rendered the work so popular on the Continent that in a short time no language in Christendom wanted its translation. It would almost appear that the work met with more undivided applause on the Continent than in Britain. While many English and Scottish physicians conceived that it was as apt to generate as to cure or prevent diseases, by inspiring the minds of readers with hypochondriacal notions, those of other countries entertained no such suspicions. Among the testimonies of approbation which Dr. Buchan received from abroad was a huge gold medalion, sent by the Empress Catherine of Russia, with a complimentary letter. The work became more popular in America and the West Indies than in the older hemisphere. Buchan published two other works: 'A Treatise on Gonorrhœa'; 'An Advice to Mothers on the Subject of their own Health, and on the Means of Promoting the Health, Strength, and Beauty of Their Offspring.' He was buried in Westminster Abbey.

Buchanan, bū-kän'än, Andrews Hays, American educator: b. Washington County, Ark., 28 June 1828. He was graduated at Cum-

BUCHANAN

berland University in 1853; and took a special course in civil engineering and mathematics in Lincoln University; taught civil engineering in 1854-61; was military topographical engineer in the Confederate army during the Civil War; and became professor of mathematics and civil engineering in Cumberland University in 1869. He was employed by the superintendent of the United States Coast and Geodetic Survey to take charge of the triangulation of Tennessee, on which work he was engaged for four months in every year from 1876 to 1896. He was the author of 'Plane and Spherical Trigonometry'; etc.

Buchanan, Claudius, Scottish missionary clergyman: b. Cambuslang, Scotland, 1766; d. 1815. He took orders in the Church of England, and was appointed chaplain to the East India Company in 1795. From this time the remainder of his life was occupied in missionary labors in India, and in forwarding the translation of the Bible into the Indian languages. In 1800 he was appointed professor of Greek, Latin, and English in the College of Fort William. He returned to Europe in 1808, afterward visited the Holy Land, and was engaged at his death in a translation of the New Testament into Syriac. He published 'Christian Researches in Asia, with a Notice of the Translation of the Scriptures into the Oriental Languages' (1811), and several other works.

Buchanan, Francis, Scottish traveler: b. Stirlingshire, 15 Feb. 1762; d. 1829. He traveled extensively in the East Indies, making collections illustrative of the botany, zoology, etc., of the countries which he visited, and published 'A Journey from Madras Through the Countries of the Mysore, Canara, and Malabar, Performed Under the Orders of the Marquis Wellesley for the Purpose of Investigating the State of Agriculture, Arts, and Commerce, etc., History, Antiquities, etc., in the Dominions of the Rajah of Mysore' (1807). He contributed largely to the scientific journals of the day, and in 1819 published a 'History of the Kingdom of Nepal,' and in the same year a 'Genealogy of the Hindu Gods,' which he had drawn up some years before with the assistance of an intelligent Brahmin. In 1822 appeared his 'Account of the Fishes of the Ganges,' with plates.

Buchanan, Franklin, American naval officer: b. Baltimore, 17 Sept. 1800; d. Talbot County, Md., 11 May 1874. At an early age he entered the navy, becoming lieutenant in 1825 and master-commandant in 1841. The organization of the United States Naval Academy was committed to him in 1845 and he was made the first superintendent. During the Mexican war he took part in the siege of Vera Cruz. In Commodore Perry's expedition to Japan he had command of the flagship. In 1855 he was raised to the rank of captain, and in 1861 resigned from the United States navy, intending to follow his State in secession, but later asked to be restored. Upon the refusal of his request, he entered the Confederate navy. In command of the *Merriam* in Hampton Roads, he sank the Congress and the Cumberland, being severely wounded during the engagement. In 1863 he commanded the naval defenses at Mobile, Ala., there constructing the ram *Tennessee*. After promotion to the rank of admiral in the Confederate navy

he was for some time senior officer in the Confederate navy and commanded at the battle of Mobile Bay, where he was defeated by Farragut, lost a leg, and was made prisoner. At the close of the War he became president of the Agricultural College of Maryland.

Buchanan, George, the chief representative of humanism in Scotland: b. near Killearn, Stirlingshire, February 1506; d. Edinburgh, 28 September 1582. He came of Celtic stock, and his family though poor was of honorable descent, tracing connection, some five generations back, with the great houses of Albany and Lennox. His father died while George was a child, and the family of five sons and three daughters was brought up by his mother, born Agnes Heriot of Trabroun in Haddingtonshire. His early education was gained at the common schools, tradition naming those of Killearn and Dumbarton; and at the age of 14 he was sent by his maternal uncle to the University of Paris, then in the throes of the struggle between humanism and Lutheranism on the one hand, and scholasticism and Catholicism on the other. He remained here for two years, his principal academic occupation being the writing of Latin verse. At the end of these two years, the death of his uncle and his own serious illness compelled his return to Scotland. In the autumn of 1523 he took part in an abortive expedition against England, led by the Regent Albany. In the spring of 1525 he went to Saint Andrews, where he graduated in October of the same year, the fee for his Bachelor's certificate being remitted on account of poverty. He returned to Paris in 1526, and, after two years as a bursar of the Scots College there, he took his Master's degree. Beginning in 1529, he taught for three years as "regent" in the College of Ste. Barbe, one of the most fully equipped and most liberal in the University, receiving food and lodging from the College and fees from the students. Here he was already known as a writer of stinging epigrams. He resigned his regentship to become tutor to the young Earl of Cassillis, a post he occupied for five years, living at first in Paris, but returning to Scotland with his pupil in 1535. It was during the latter part of this engagement that he first roused the antagonism of the Franciscan order by his 'Somnium,' a Latin poem paraphrasing the well-known Scots satire 'How Dunbar was desyrit to be ane Fryer.' At the conclusion of his period with Cassillis, he was appointed tutor to one of the natural sons of James V., and through this came into close relations with the court. At the instance of the King he produced two more short satires against the Franciscans, and began his 'Franciscanus', a brilliant and elaborate piece of invective, finished much later. The wrath roused by these attacks forced Buchanan to flee from Scotland to save his life; and after a short sojourn in England, where he addressed poems to Henry VIII. and Cromwell, he returned to Paris. There he found Cardinal Beaton, who had been the chief agent in driving him out of Scotland, and for safety he was glad to accept a position in the Collège de Guyenne at Bordeaux, under André de Gouvéa, formerly his colleague at Ste. Barbe. He remained here three years, counting among his pupils

BUCHANAN

the celebrated Montaigne, and among his acquaintances, J. C. Scaliger. While at Bordeaux Buchanan translated into Latin the 'Medea' and the 'Alcestis' of Euripides, and composed his two original dramas, 'Jephthes' and 'Baptistes.' Leaving Bordeaux in 1542 or 1543, he seems to have returned to Paris, where he may have taught till about 1545 in the Collège du Cardinal Lemoine; but the record of these years is obscure, and for the next three we are altogether without evidence as to his residence or occupation. In 1547 we find him in Portugal, again under André de Gouvêa, teaching in the College of Arts of the University of Coimbra. On Gouvêa's death, the College fell into the hands of the Jesuits, who proceeded to accuse Buchanan of heresy. After a persecution of a year and a half, he was shut up for some months in a monastery to be instructed in the true faith by the monks. There he made most of his famous Latin translations of the Psalms, and during the same period produced his poems to Leonora. On his liberation in 1552, he spent a short time in England, then returned to France, where for a while he held once more the office of regent, this time in the Collège Boncourt. In 1555 his patron, Charles du Cossé, Comte de Brissac, appointed him tutor to his son Timoleon, whom he instructed from the age of 12 to that of 17, living sometimes in France, sometimes in Italy. During these years Buchanan seems to have given closer attention than formerly to the religious controversies of the day; and when he returned to Scotland about 1561, he took the side of the reformed Church of Scotland. In spite of this decision for Protestantism, we find him soon after his return acting as tutor to Queen Mary, and writing court masques and complimentary poems. He received an annual pension of 250 pounds Scots, a sum apparently inadequate to his needs. In 1564 the Queen bestowed on him a pension of 500 pounds Scots from the income of the Abbey of Crossraguel, but this he seems to have had difficulty in collecting. His friendly relations with Mary continued till the murder of Darnley in 1567, which turned him into her open enemy. He wrote the virulent 'Detectio Mariæ Reginae Scotorum,' the work which was the chief means of spreading throughout Europe a belief in the guilt of the Queen. Meantime Buchanan had become an important figure in the Scottish Church, and in 1567 he was Moderator of the General Assembly which demanded Mary's abdication in favor of her son. About this time he produced his two most important vernacular writings, the 'Admonition to the Trew Lordis', a pamphlet in support of the party of the young King James and against the house of Hamilton; and the 'Chamæleon,' an attack on Maitland of Lethington.

In 1566 Buchanan was appointed Principal of Saint Leonard's College of Saint Andrews University; but he resigned his Principalship in 1570 to take charge of the education of the young King, James VI., then four years old; and he continued to superintend his instruction for about eight years. During this period he was for a short time Director of Chancery, and later Keeper of the Privy Seal. In spite of these appointments, he does not seem to have held, or to have sought, a leading position

in politics. The most important writings of his later years were a dialogue, 'De Jure Regni apud Scotos,' a defence of Scotland's treatment of Mary; and his 'Rerum Scotticarum Historia,' published in 1582. In September of that year he died, and was buried in Grayfriars Churchyard in Edinburgh.

The comparative obscurity into which Buchanan's name and writings have sunk to-day is in striking contrast to the splendor of his contemporary reputation. Throughout the latter part of the sixteenth century he was regarded by men of letters in Europe as easily the most distinguished representative of humanism in Britain, and this reputation continued for more than a century after his death. The contrast is explained by the medium in which he wrote. Like most of his learned contemporaries, he had no doubt that Latin was to be the universal language of the future, and almost all his writings are in that language. His mastery of Latin remains the admiration of scholars, but for the world in general his works are dead.

By genius and temperament he was a poet, and his Latin verses represent his best work. These belong to the conventional types of his age. Of his satires, the most notable are those already mentioned, against the Franciscans. To modern taste they pass the bounds of decency; but in brilliance and point they stand in the first rank of post-classical productions. His epigrams are entitled to the same blame and the same praise. He wrote complimentary poems to most of the persons of distinction with whom he came in contact, and an epithalamium on the marriage of Mary and the Dauphin, containing a famous passage in praise of the Scots. More genuinely poetical is his piece on 'The First of May.' His love-poetry need not be taken as having any relation whatever to his experience. Such poems as those to Leonora and Neera are merely academic exercises in the fashion of the Renaissance on the model of Catullus and Tibullus. Of his dramatic efforts, the most artistic is 'Jephthes,' a play which still holds a place among the best of the attempts to revive the drama of antiquity. 'Baptistes,' under the guise of the story of John the Baptist, is a thinly-veiled parable expressing Buchanan's views on kingship. His most ambitious poem is the 'De Sphæra,' an elaborate exposition of the Ptolemaic system of astronomy; and his most popular production is his Latin translation of the Psalms into a variety of classical metres. The last continued to be used as a schoolbook in his native country into the nineteenth century.

Of his prose works, his 'De Jure Regni' sets forth explicitly and with special reference to Scotland the same doctrine of the sovereignty of the people which was shadowed in 'Baptistes.' Both this work and his history earned the distinction of being later suppressed by the government. The 'Historia' covered the history of Scotland from the earliest times till 1580; and while far from being a critical work in the modern sense, is much more discriminating than most of the chronicles that preceded it. Its chief value is for the period of his own life, and here his authority is that of the honest partisan.

The general impression left by his work is

BUCHANAN

that of an acute, vigorous, and independent mind, poetical rather than practical or philosophical; of a temperament capable of strong emotion; of a character showing some of the defects common to most men of his age, but on the whole straightforward and robust. And if the use of Latin has caused his writings to cease to be read to-day, it is to be remembered that for the Europe of his own time he was the foremost man of letters in Britain, and in the opinion of such judges as the Scaligers and Montaigne, the first Latin poet in Europe.

Bibliography.—Buchanan's complete works were collected by T. Ruddiman (re-edited by Peter Burman, 2 vols., Lugduni Batavorum, 1725). The vernacular writings have been issued by the Scottish Text Society, with life and notes by P. Hume Brown (Edin. 1892). The 'Lives' by Irving and Chalmers are now superseded by P. Hume Brown's 'George Buchanan' (Edin. 1890). Shorter sketches are those of D. Macmillan (Edin. 1906), and of Robert Wallace, 'Famous Scots Series' (Edin. 1900). His portraits are discussed in Drummond's 'Portraits of Knox and Buchanan' (1875). Bibliographies are given by Ruddiman and Irving.

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Buchanan, George, Scottish surgeon: b. Glasgow, 1827. He became surgeon of the Western Infirmary of Glasgow and later served as civil surgeon with the British army in the Crimean war. In 1888 he was elected president of the surgical section of the British Medical Association, and in 1900 was appointed professor of clinical surgery in the Glasgow University. He was the author of 'Camp Life in the Crimea'; 'On Lithotrity, with Cases'; 'Clinical Surgery'; 'Radical Cure of Inguinal Hernia in Children'; 'Talipes Varus'; 'Faure's Storage Battery and Electricity in Surgery'; and 'Anæsthesia Jubilee, a Retrospect.' He was one of the editors of the 'Glasgow Medical Journal,' and also edited the 10th edition of the 'Anatomist's Vade Mecum.'

Buchanan, James, fifteenth President of the United States: b. Stony Batter, Franklin County, Pa., 22 April 1791; d. Lancaster, Pa., 1 June 1868. His father was by birth an Irishman, who had quitted Europe in 1783, and established himself on a farm at Stony Batter. The son was educated at Dickinson College, Carlisle, where he graduated. He subsequently entered the office of James Hopkins of Lancaster to study law, and was admitted to the bar in 1812. Although holding Federalist opinions at this time he supported the War of 1812. In 1814 he was elected to the legislature of Pennsylvania, and in 1820 was sent to Congress, of which he continued a member till 1831, being re-elected four times. He then entered upon a career of diplomacy, being charged by President Jackson with a special mission to Russia for the conclusion of a commercial treaty. On his return, in 1833, he was elected to the Senate. About this time the anti-slavery agitation began to assume importance. Buchanan wished to prevent the agitation reaching Congress, by declaring its incompetency to deal with it. He held that constitutionally it was a question for the individual States, and that it was better for all parties, even for the slaves themselves, that

it should remain so. Under the presidency of Polk, 1845-9, Buchanan was intrusted with the functions of secretary of state. The annexation of Texas and the war with Mexico were the chief events of his administration. During the presidency of Gen. Taylor he retired from public life. In 1853 Gen. Pierce, on being elected President, named him ambassador of the United States at London. He held this appointment till 1856. The Central American boundary and the project of the annexation of Cuba were the principal subjects discussed during his embassy. With Mason and Soulé he signed the Ostend manifesto which recommended the acquisition of Cuba. While maintaining with ability the views of his own country, he gained the esteem of that to which he was deputed by the prudence and moderate tone of his diplomacy. He returned to America in 1856, being chosen as candidate for the presidency by the Democratic party. He was elected by a large majority over Fremont, the Republican candidate, and inaugurated in March 1857. His foreign policy inclined to the aggressive views he had always advocated, but the questions of slavery and State-rights were at this period approaching a crisis which made home administration of much greater importance. As President he deferred constantly to pro-slavery leaders and was unduly influenced by their threats of secession. His character for statesmanship suffered greatly from his vacillation in dealing with the first measures of the seceders; but it must be considered that the position of a ruler holding office as the *locum tenens* of his successor is not favorable to a vigorous administration in a difficult crisis. He took up the position that while the States had no right to secede, the nation had no power to prevent their doing so. He supported the administration of Lincoln, and lent his influence to the vigorous prosecution of the War, declaring that the North would sustain the administration almost to a man, and that it ought to be sustained at all hazards. Consult his own defense of his course, 'Mr. Buchanan's Administration on the Eve of the Rebellion' (1866); Curtis, 'Life of James Buchanan' (1883).

Buchanan, Robert Christie, American soldier: b. Baltimore, about 1811; d. Washington, 20 Nov. 1878. He graduated at the United States Military Academy in 1830, and served in the Black Hawk war in the rank of second lieutenant. From 1837-8 he served in the Seminole war, and from 1845-6 in the military occupation of Texas. During the Mexican war he was promoted for gallantry. In 1856 he was placed in command of the military district of Oregon and northern California. Early in the Civil War he was promoted lieutenant-colonel. He fought in the Peninsular campaign, and on the Rappahannock, winning at Gaines Mills the rank of brevet-colonel, and at Malvern Hill that of brevet-brigadier-general. He was in the battles of Antietam and Fredericksburg, and was promoted brevet-major-general. In 1864 he was assistant provost-marshal for New York. In 1870 he retired from active service.

Buchanan, Robert Williams, English poet and novelist: b. Caverswall, Staffordshire, 18 Aug. 1841; d. London, 10 June 1901. He received his education in Glasgow, and while young went to London to engage in literature.



JAMES BUCHANAN,
FIFTEENTH PRESIDENT OF THE UNITED STATES.

His attack upon Dante Gabriel Rossetti, 'The Fleshly School of Poetry,' drew a famous letter from that poet on 'The Stealthy School of Criticism,' and a scathing pamphlet from Swinburne, 'Under the Microscope' (1872). It should be added that in later life he regretted his course in this matter. His poems include 'Undertones' (1863); 'Idylls and Legends of Inverburn' (1865); 'London Poems,' his best effort (1866); 'North Coast Poems' (1867); 'Book of Orm, the Celt' (1868); 'St. Abe and His Seven Wives' (1871); 'Napoleon Fallen: a Lyrical Drama' (1871); 'The Drama of Kings' (1871); 'Ballads of Love, Life and Humor' (1882); 'The City of Dreams' (1888); 'White Rose and Red'; 'The Wandering Jew' (1893). His best novels are 'The Shadow of the Sword' (1876); 'A Child of Nature' (1879); 'God and the Man' (1881); 'The Martyrdom of Madeline' (1882); and 'Foxglove Manor' (1884).

Buchanan, William Insko, American diplomat: b. near Covington, Ohio, 10 Sept. 1852; d. 17 Oct. 1909. Educated in country schools, living on a farm in early life; removed to Sioux City, Iowa, 1882. In 1894 he was appointed United States Minister to the Argentine Republic; in 1903 was appointed United States minister to the Republic of Panama.

Buchana'nia, a genus of *anacardiaceæ*, named after Dr. Buchanan Hamilton, a well-known Indian botanist. *B. latifolia* is a large Indian tree, the kernel of the nut of which is much used in native confectionery.

Buchanites, būk'an-its, a sect of enthusiasts who sprung up at Irvine, in the west of Scotland, about 1783. Rev. Hugh White, the minister of a congregation of the Relief Church in that town, having been invited to preach in the neighborhood of Glasgow, Elizabeth Buchan, the wife of a painter, was captivated with his eloquence, and writing to him, announced that he was the first who had spoken to her heart, and requested permission to pay him a visit at Irvine, that the work of her conversion might be perfected. On her arrival she was joyfully received by the members of the congregation, engaged without intermission in religious exercises, went from house to house, conducted family worship, answered questions, resolved doubts, explained the Scriptures, and testified that the end of the world was at hand, and that it was the duty of every Christian to abandon the concerns of time and prepare for the reception of Christ. White was complained of to the presbytery, by which he was deposed from his ministry. Thus a distinct party was formed, the meetings of which were commonly held at night, and on these occasions the new prophetess indulged in her reveries, styling herself the Woman of the Twelfth of Revelations, and White her first-born. Such gross outrage on the common sense of the inhabitants occasioned a popular tumult, to save her from the fury of which the magistrate sent her under escort to some distance; after which, with her clerical friend, and about 40 deluded followers, she wandered up and down the country, singing, and avowing that they were travelers for the New Jerusalem, and the expectants of the immediate coming of Christ. They had a common fund, and did not consider it necessary to work, as they believed God would not suffer them to want. See BUCHAN, ELSPETH.

Bucharest, boo-ka-rést', or **Bukarest** (Rumanian, *București*, that is, 'city of joy'), formerly the chief city of Walachia, now the capital of the kingdom of Rumania, on the Dimbovitza, 37 miles from its mouth. It is the most populous city of southeastern Europe after Constantinople and Budapest, and is spoken of by the Rumanians as the Paris of the East. Besides being the seat of government, Bucharest is the residence of a Greek archbishop. The houses are mostly of one story, built of brick, pointed externally, and have metal roofs. The streets are mostly narrow and crooked, the most important being the Boulevard, running from east to west, the Calea Victoriei, the Lipsca, and the Karlsstrasse. There are statues to Joan Heliade-Radulescu, the father of Rumanian literature; George Lazar; and others. Twelve bridges, five of iron, and seven of stone, cross the Dimbovitza, a small, muddy stream that formerly caused a good deal of damage by inundations. From 1885 till 1896 extensive fortifications were erected, there being now 18 forts in the circle of defense. The inhabitants nearly all belong to the Greek Church. The churches are very numerous, but few of them are architecturally noteworthy; the chief being the metropolitan cathedral, built in 1656, restored in 1834, and standing on a hill, and the Roman Catholic cathedral, built in 1875-84, one of the chief ornaments of the city. Bucharest has a university, and connected with it a public library and a museum of natural history and antiquities. There are four lyceums, two gymnasia, some technical and military schools, a conservatory of music, girls' schools, and other educational institutions. There are a few fine public buildings, of which the most conspicuous is the royal palace, recently rebuilt; among the others being the new Palace of Justice, the National Theatre, the atheneum, the post-office, and several fine hotels. What chiefly distinguishes Bucharest is the magnificence of the public gardens. There is a mixture in the population of eastern habits, with European civilization among the upper classes. The manufactures comprise iron goods, earthenware, leather, linen, soap, paper, beer, etc., but they are of no great importance. There is an active trade, Bucharest being an entrepôt both for the kingdom of Rumania and for adjacent countries. It imports manufactured goods, and exports grain, wool, honey, wax, tallow, and cattle, the produce of the country. In 1698, when it became the capital of Walachia, it was only a village. It was pillaged by the Servians in 1716; taken by the Russians in 1769 and 1806; occupied by them again in 1828-9 and 1853-4; by the Austrians in 1774, 1789, and 1854; was partly destroyed by fire in 1847; and became the capital of Rumania in 1862. Peace congresses were held here, 1772-3, and in 1812, and in 1886 peace was concluded here between Servia and Bulgaria. Pop. about 300,000. See BUCHAREST, PEACE OF; BUCHAREST, UNIVERSITY OF.

Bucharest, Peace of, a treaty signed 28 May 1812, between Russia and the Porte. In November 1806 the Emperor Alexander took up arms for the protection of Moldavia and Walachia, and on account of the violation of the free navigation of the Bosphorus. He occupied Moldavia, upon which the Porte declared war against Russia, 7 Jan. 1807. An armistice, how-

ever, was agreed upon at Slobosia, 24 Aug. 1807, and after the expiration of the truce in April 1808, it was tacitly continued; but in April 1809 the war was renewed. The Russians advanced to Bulgaria, and after two fierce campaigns remained masters of the Danube. The Porte now offered terms of peace. A congress was opened at Bucharest in December 1811. Napoleon did all in his power to induce the Porte to continue the war; but the interposition of Great Britain and Sweden, as well as the concessions of Russia, and the distrust of the Porte toward Napoleon, brought to a conclusion the Peace of Bucharest. The Porte gave up to Russia all Bessarabia and a third of Moldavia, with the fortresses of Choczim, Bender, Ismail, and Kilia, so that the Pruth, as far as its confluence with the Danube, became the boundary between the two powers, and from thence the left bank of the Danube as far as Kilia, and even to its entrance into the Black Sea. The Russians gave back the rest of their conquests. In Asia the boundaries were established as before the war. The boundary then settled between Russia and Turkey was modified in favor of the Porte at the Peace of Paris, 30 March 1856.

Bucharest, University of, a university in the city of Bucharest, under the control of the state government of Rumania. It was founded in 1864. In addition to the usual academic, scientific, and professional departments, with courses followed by about 4,300 students, there is a school of pharmacy. There are museums and laboratories connected with the university.

Bücheler, Franz, fränts bük'ë-lër, German philologist: b. Rheinberg, 3 June 1837. He studied at Bonn and has been professor there from 1870. His specialty has been in the field of ancient Italian dialects. He has published 'Grundriss der lateinischen Deklination' (1866), and other important works, and since 1878 has been an associate editor of the 'Rheinisches Museum für Philologie.'

Bucher, Anton von, än'tön fön booh'ër, German polemical writer: b. Munich, 8 Jan. 1746; d. 1817. He was educated in the Latin schools of the Jesuits, studied at Ingoldstadt, and was consecrated priest in 1768. In his different offices as a public teacher he did a great deal in his day to instruct and enlighten his country. He incurred the enmity of the Jesuits by his satirical attacks upon them. His contributions to the history of the Jesuits in Bavaria (Beiträge zur Geschichte der Jesuiten in Baiern) are of great historical value. His collected works appeared in 1819-20.

Buchez, Philippe Joseph Benjamin, fë-lëp zhô-zëf bôn-zha-män bü-shä, French philosopher: b. Matange-la-Petite (now in Belgium), 31 March 1796; d. Rodez, France, 12 Aug. 1865. He gave himself up to the study of the natural sciences, and in particular to medicine, receiving his doctor's degree in 1825. He was bitterly hostile to the government of the Restoration, and was one of those who, in 1821, founded the French Society of Carbonari. He became chief editor of the 'Journal des Progrès des Sciences et Institutions Medicales,' and in 1826 assisted in editing the 'Producteur,' a weekly paper which advocated the doctrines of Saint-Simonism. In 1831 he founded a journal of moral and political science, called 'L'Européen,' in which he expounded those doctrines which owe

their origin chiefly to himself, and have been collectively denominated 'Buchezism.' The fundamental idea of his system is that of the progress and development of the human race. But progress presupposes an aim, and this aim must be pointed out beforehand, or *revealed*. Thus the idea of progress leads him to the orthodox belief in revelation. This theory is worked out in his 'Introduction à la Science de l'Histoire' (1833); and his 'Essai d'un Traité Complet de Philosophie au Point de Vue du Catholicisme et du Progrès' (1839). Along with his predilections for the Catholic Church he still retained his strong democratic and republican opinions, and with M. Roux-Lavergne published 'Histoire Parlementaire de la Révolution Française, ou Journal des Assemblées Nationales, depuis 1789 jusqu'en 1815' (40 vols. 1833-8). After the revolution of 1848 he was elected to the constituent National Assembly, of which he was soon appointed **president**. Thenceforth he held aloof from public life, prosecuting his studies and writing several works, among which is the 'Histoire de la Formation de la Nationalité Française' (1859).

Buchholz (booh'hälts) **Family**, a series of sketches by Julius Stinde, representing life among the middle-classes of the German capital. The books are entertainingly written, and are very popular in Germany.

Büchner, Friedrich Karl Christian Ludwig, frëd-rih kärl krës'ti-än lood-vig büh'nër, German physician and materialist philosopher: b. Darmstadt, 29 March 1824; d. Darmstadt, 1 May 1899. He studied at Giessen, Strasburg, Würzburg, and Vienna; became a lecturer at Tübingen University; and, in 1855, published 'Kraft und Stoff' (14th ed. 1876; English translation, 'Force and Matter' 1870), in which he attempted scientifically to establish a materialistic view of the universe. A violent controversy was raised; and Büchner saw himself compelled to resign his university post, and begin medical practice in Darmstadt. He wrote numerous contributions to periodicals on physiological and pathological subjects, as also in support of his atomistic philosophy; published in the latter department 'Natur und Geist' (1857); 'Aus Natur und Wissenschaft' (1862-84); as well as works on Darwinism, the idea of God, the intelligence of animals, etc.; and has translated Lyell's 'Antiquity of Man' (1864).

Büchner, Georg, gä'örg, German poet, brother of F. K. C. L. Büchner (q.v.): b. Goddieu, near Darmstadt, 17 Oct. 1813; d. Zurich, Switzerland, 19 Feb. 1837. In 1834 he entered the political arena with a manifesto entitled 'The Rural Messenger,' and bearing the motto: 'Peace to the cabin; war to the palace.' To escape arrest he fled to Strasburg, where he studied the philosophies of Descartes and Spinoza. He wrote a drama in 1834, on 'The Death of Danton,' the work of a genuine but undisciplined poet. His 'Complete Works,' with biography, was published in 1879.

Buchner, Hans, hänts booh'nër, German scientist: b. Munich, 1850. After studying at the universities of Strasburg and Giessen, he became lecturer on hygiene at Munich in 1880 and professor in 1892. He has made many important researches in bacteriology.

BUCHNER — BUCK

Büchner, Luise, loo-êz bûn'nér, German poet and novelist, sister of Georg Büchner: b. 12 June 1821; d. Darmstadt, 28 Nov. 1877. Her first publication, 'Women and Their Calling' (1855), was followed by many others on the 'woman's rights question'; it commanded much attention, and reached a fifth edition (1883). She wrote a volume of tales, 'From Life' (1861); 'Poet-Voices of Home and Foreign Lands'; several original poems; 'Woman's Heart'; some 'Christmas Stories'; etc.

Büchner, Max, German traveler and scientist: b. Hamburg, 25 April 1846. After serving as surgeon in the German army and navy, he traveled around the earth (1875), and spent some time in New Zealand. In 1878 he bore presents from the emperor to Muatiamvo, in the kingdom of Lunda, in equatorial Africa. After several vain attempts to break through toward the north, he returned to the coast. In 1884 he accompanied Nachtigal in founding the colonies of Togo and Kamerun, in western Africa, where he acted temporarily as representative of the German empire, fought the natives, and concluded treaties with chiefs in the interior. In 1888, as conservator of the Ethnographical Museum of Munich, he traveled in Australia, Guinea, and East Asia. He wrote 'A Trip Through the Pacific Ocean' (1878); and 'Kamerun' (1888).

Buchon, Jean Alexandre, zhôn ä-lëks-ândr bû-shôn, French historical writer: b. Ménetou-Salon, 21 May 1791; d. 30 April 1846. Having gone to Paris, he became collaborateur on several liberal journals, and early took part in the opposition to the restoration. He was in consequence several times prosecuted by the government, and his writings, such as his 'Vie de Tasse' (1817), were interdicted. In 1821 he gave a course of lectures in the Athénæum on the history of dramatic art in England; and in the following years he traveled over the greater part of Europe for the purpose of collecting documents to illustrate the history of France during the Middle Ages. After his return he published his 'Collection des Chroniques Nationales Françaises, écrites en Langue Vulgaire du XIII^eme au XVI^eme Siècle' (47 vols. 1824-9), which he began with the 'Chroniques de Froissart' (15 vols. 1824-6). He was appointed inspector of the archives and libraries of France in 1828, and in 1829 inspector-general of the departmental and communal archives; but soon lost his office through a change of ministry. In addition to the works of this indefatigable writer already mentioned, may be named his 'Histoire Populaire des Français' (1832); 'La Grèce Continentale et la Morée' (1843); 'Histoire des Conquêtes et de l'Etablissement des Français dans les Etats de l'ancienne Grèce sous les Ville-Hardouin' (1846); besides his editions of Brantôme, etc., and his articles in cyclopedias and magazines.

Buchtel, book'tel, Henry Augustus, American clergyman and educator: b. Akron, Ohio, 30 Sept. 1847. He was educated at Asbury (now De Pauw) University, entered the Methodist ministry, and held pastorates in various parts of Indiana, New York, New Jersey, and Colorado. Since 1900 he has been chancellor of the University of Denver. In 1906 he was elected governor of Colorado.

Buchtel College, a co-educational institution in Akron, Ohio, founded in 1871, under the auspices of the Universalist Church, and named for John R. Buchtel, who gave it \$500,000. In 1910 its productive funds were \$190,000, and income \$49,206 and the value of the buildings and grounds about \$300,000. It had 20 professors, and 297 students, and some 9,000 volumes in its library.

Buchu, bú'kú, a South African name for several species of *barosma*, especially *B. crenata*, *crenulata*, and *serratifolia*. They belong to the order *Rutaceæ*, and the section *Endiosmea*. They have a powerful and usually offensive odor, and have been recommended as antispasmodics and diuretics.

Buck, Carl Darling, American philologist: b. Bucksport, Me., 2 Oct. 1866. He graduated from Yale in 1886; took the degree of Ph.D. there in 1889; and was a member of the American School of Classical Studies at Athens in 1887-9. In 1892, he became professor of Sanskrit and comparative philology at the University of Chicago. He has written 'Vocalismus der Okischen Sprache'; 'Discoveries in the Attic Deme of Ikaria' (in 'Papers of the American School of Classical Study, Athens,' Vol. V.); 'The Oscan-Umbrian Verb System'; 'Latin Grammar' (with W. G. Hale); and several papers in the 'American Journal of Philology.'

Buck, Dudley, American organist and composer: b. Hartford, Conn., 10 March 1839. After musical study at home and in Leipzig, whence he returned in 1862, he became organist at Park Church, Hartford, and successively at St. James' Church, Chicago, Music Hall, Boston, and St. Ann's Church, Church of the Holy Trinity, and Plymouth Church, Brooklyn, retiring in 1903. He has written several books: 'A Dictionary of Musical Terms'; a work on 'The Influence of the Organ in History' (1882), etc. The 'Centennial Cantata,' for the opening of the Exposition of 1876, by appointment of the U. S. Centennial Commission, the 'Forty-sixth Psalm' the 'Legend of Don Munio,' the 'Golden Legend,' and the 'Marmion' symphonic overture, are among his larger works with orchestra. He has also composited chamber music, songs, and male-voice pieces. Among his later works may likewise be mentioned 'The Voyage of Columbus,' 'The Light of Asia,' 'The Christian Year,' and 'Deseret,' a comic opera.

Buck, Jirah Dewey, American physician and theosophist: b. Fredonia, N. Y., 1838. He graduated in 1864 from the Cleveland Homœopathic College, became professor in that institution and later settled in practice in Cincinnati. He was afterward made professor of therapeutics in the Pulte Medical College. He is well-known for his theosophical studies and has been elected president of the Theosophical Society in America. Among his works are 'The Nature and Aims of Theosophy'; 'A Study of Man and the Way to Health'; 'Mystic Masonry'; 'Browning's Paracelsus and Other Essays'; 'Why I Am a Theosophist.'

Buck, a name sometimes distinctively appropriated to the adult male of the fallow deer, the female of which is a doe. The term is often also applied to the male of other species of deer, as of the roebuck, although never to that of the red deer, which, when mature, is a stag or a hart.

BUCK-BEAN — BUCKINGHAM

Buck-bean, Bog-bean, or Marsh-tréfoil (*Menyanthes trifoliata*), a beautiful plant belonging to the *Menyanthea*, a subdivision of the natural order of the *Gentianaceae*. It is common in spongy, boggy soils, throughout the northern temperate lands, and flowers about the latter end of May and early June. It has a procumbent stem rising to a height of 6 to 12 inches, and covered by the sheaths of the leaves, and a creeping jointed root. The leaves are trifoliate (like those of clover), with obtuse, ovate leaflets. The flower-stalk terminates in a thyrses of white flowers, rose-colored outwardly. The calyx is five-parted, the corolla funnel-shaped, spreading, and clothed on the inner surface with a coating of dense fleshy hairs. The fruit consists of a one-celled, two-valved capsule containing numerous seeds. The whole plant, the root especially, has an intensely bitter taste, and an extract of it ranks as a valuable tonic quite equal in its effects to gentian. It is not so frequently employed now, however, as it used to be. It is said to be beneficial in intermittent fevers, gout, liver complaints, dropsy, scurvy, etc. In the north of Europe it is sometimes used instead of hops to give bitterness to beer; and in Lapland an unpalatable kind of bread is made from the powdered roots.

Buck-board, a four-wheeled vehicle having the seat mounted on an elastic board instead of springs. Buckboards were intended originally for rough and hilly roads and were rather primitive in construction, but became so popular that the styles at present employed are greatly improved in form and finish.

Buckets, in water-wheels, are a series of cavities into which the water is delivered, on the circumference of the wheel to be set in motion. By the revolution of the wheel the buckets will be alternately erected so as to receive water and inverted so as to discharge it; the loaded side will descend, and present the empty buckets in succession to the current, and thus keep up a constant revolution of the wheel. Buckets made of wood and of various metals, are also used for many other mechanical purposes, as in grain-elevators, dredges, etc.

Buckeye. The name in the central and southern United States for native species of trees of the horse-chestnut genus, especially the sweet buckeye (*Æsculus octandra*), abundant in Ohio and southward. See HORSE-CHESTNUT.

Buckeye State, a nickname applied to the State of Ohio.

Buck'ham, Matthew Henry, American educator: b. Leicestershire, England, 1832; d. 29 Nov. 1910. He came to the United States in infancy. In 1851 he was graduated from the University of Vermont and later became principal of the academy of Lenox, Mass. After studying and traveling in Europe, he became professor of Greek in the University of Vermont, and in 1871, president. He published numerous sermons, addresses, and reviews.

Buckhound. See DEERHOUND.

Buckingham, būk'ing-ām, George Villiers, Duke of, British courtier: b. Brookesby, Leicestershire, 20 Aug. 1592; d. Portsmouth, 24 Aug. 1628. He was the unworthy favorite of James I. and Charles I. His family went to

England from Normandy in the time of William the Conqueror. His father was George Villiers, Knight; his mother was descended from the ancient family of Beaumont. His father died when he was 13, and at 18 he was sent to France, where he resided three years, and acquired great skill in all bodily exercises. This, together with his beauty of person and graceful manners, made so great an impression on James I., who gave him the familiar name of Steenie, that in less than two years he was made a knight, a gentleman of the bed-chamber, baron, viscount, Marquis of Buckingham, lord high admiral, lord warden of the Cinque Ports, etc., and at last dispenser of all the honors, offices, favors, and revenues of the three kingdoms, according to the dictates of his ambition, his cupidity, and his caprice. The nation was indignant at seeing merit undervalued, the people trampled upon, the nobility humbled, the crown impoverished and degraded, to elevate and enrich a weak and insolent favorite. Such rapid and undeserved promotion likewise caused many private jealousies. In 1623 he engaged in a romantic adventure with Charles, Prince of Wales, in connection with which traitorous views have been attributed to him. The Earl of Bristol was negotiating a marriage for the prince with the Infanta of Spain. Buckingham persuaded the prince to go to Madrid, and carry on his suit in person. They set out incognito, passed through various adventures, and saw on their way the Princess Henrietta Maria of France, whom Charles afterward married. The result of this journey is well known. The marriage was broken off, war declared with Spain, and Bristol was impeached. Buckingham was created a duke during his absence, and whatever misconduct may have been associated with the design or execution of his mission, his favor with the king and prince remained unimpaired. James died in March 1625, and in May of the same year Buckingham was sent to France as proxy for Charles I., to marry the Princess Henrietta Maria. In the following year the unpopularity of the war with Spain, and the failure of the expedition to Cadiz, caused his impeachment, from the consequences of which he was saved by his favor with the king. His intrigues soon after brought on war with France, and he was intrusted with an expedition to succor the Rochelle, but they refused his aid, and he carried his forces to the Isle of Rhé, where, after three months spent in unskilful operations, he suffered a defeat in re-embarking which cost 2,000 men. Notwithstanding this proof of incapacity, a large force was again intrusted to him to renew the attempt on Rochelle. He went to Portsmouth to superintend the preparation, and there was assassinated by John Felton, a lieutenant who had withdrawn from the army in consequence of being disappointed in promotion.

Buckingham, George Villiers, Duke of, son of the preceding: b. Westminster, 30 Jan. 1628; d. Kirkby Moorside, Yorkshire, 16 April 1687. After studying at Trinity College, Cambridge, he traveled abroad, and on his return home, after the commencement of the civil war, he was presented to the king at Oxford. He served in the royal army, under Prince Rupert and Lord Gerard. His estate was seized

by the Parliament; but having obtained the restoration of it, he traveled with his brother into France and Italy. In 1648 he returned to England, and was with Charles II. in Scotland, and at the battle of Worcester. He followed that prince abroad, and served as a volunteer in the French army in Flanders. He afterward returned to England, and in 1657 married the daughter of Lord Fairfax, by which means he repaired the ruin of his fortune in the royal cause. He, however, preserved the favor of Charles II., and at the Restoration was made master of the horse. He also became one of the king's confidential ministers, who were designated by the appellation of the "Cabal" (1667-73). His political conduct was, like his general behavior, characterized by unprincipled levity and imprudence. In 1666 he engaged in a conspiracy to effect a change of the government; notwithstanding which, he recovered the favor of King Charles, which he repeatedly abused. The profligacy of his private life was notorious. He seduced the Countess of Shrewsbury, and killed her husband in a duel; and he was more than suspected of having been the instigator of the infamous Col. Blood to his brutal outrage against the Duke of Ormond, whom he attempted, with the assistance of other ruffians, to carry to Tyburn and hang on the common gallows. In 1677 he was, together with the Earls of Shaftesbury and Salisbury and Lord Wharton, committed to the Tower for a contempt, by order of the House of Lords, but on petitioning the king, they were released. He plotted against the government with the Dissenters, and made himself an object of contempt to all parties. Pope ('Moral Essays,' epistle 3d) has more strikingly than accurately described his death. His abilities were far superior to those of his father; and among his literary compositions the comedy, or rather the witty burlesque, of 'The Rehearsal' may be mentioned as a work which displays no common powers, and which greatly contributed to the correction of a corrupted public taste.

Buckingham, James Silk, English traveler and editor: b. Flushing, Cornwall, 25 Aug. 1786; d. London, 30 June 1855. He made three voyages to Lisbon while yet a mere boy. In 1815 he went to Bombay, and in the following year, after many vicissitudes, to Calcutta, where he established the *Calcutta Journal*, but the censorship of the press was then in full force in India, and Buckingham, having offended government, his printing presses were seized, and he himself compelled to quit the presidency of Bengal and return to England, where he began to deliver lectures in London in favor of free trade to the East, and the extinction of the East India Company's monopoly. He also established in London, 1824, the *Oriental Herald*, and four years later the *Athenaeum*, now one of the foremost English weeklies, and prepared for the press the manuscript journals of his travels. In 1822 appeared 'Travels in Palestine'; in 1825, 'Travels in Arabia'; in 1827, 'Travels in Mesopotamia'; and in 1830, 'Travels in Assyria and Media.' In 1832 he was chosen member of Parliament for Sheffield, and retained his seat till 1837. Subsequently to this he made a tour of three years in America, resulting in the publication of eight volumes on the United States, and one on British North America. In 1843 he became secretary to

the British and Foreign Institute—a literary club which he had mainly contributed to form; but in this capacity he unfortunately drew upon himself the animadversions of 'Punch,' which at last fairly extinguished the society. In the later years of his life he delivered lectures in various parts of the country. He was a zealous promoter of the temperance cause, and president of the London Temperance League. In 1849 appeared his 'National Evils and Practical Remedies.' He also published two volumes on Belgium, the Rhine, and Switzerland, and two on France and Piedmont, the result of tours on the Continent. His last work was his 'Autobiography,' two volumes of which appeared in 1855, but its completion was prevented by the author's death. A few years before this the East India Company had granted him a pension, which was afterward continued to his widow, and he had also a pension of £200 a year from the civil list.

Buckingham, Joseph Tinker, American journalist: b. Windham, Conn., 21 Dec. 1779; d. Cambridge, Mass., 11 April 1861. His father exhausted his whole property in supporting the American army during the Revolution, and died leaving a family without means of support. At Worthington, Mass., Joseph was apprenticed to a farmer, with whom he remained for several years, during which he made himself acquainted with the rudiments of an English education. At 16 he entered a printing-office and became acquainted with the elements of the profession in which he was afterward to gain distinction. In Boston, 1806, he began life for himself by the publication of 'The Polyanthus,' a monthly magazine, which, after one year, was discontinued and not resumed until 1812. In 1809 he published for six months the 'Ordeal,' a weekly. In 1817 he began the publication of 'The New England Galaxy and Masonic Magazine,' which he continued until 1828. From 1831 to 1834 he published 'The New England Magazine.' In 1824 he published the first number of the Boston *Courier*, which he continued to edit until 1848. Mr. Buckingham was several times elected to the legislature, serving in both Houses. Among his publications deserving mention are: 'Specimens of Newspaper Literature, with Personal Memoirs, Anecdotes and Reminiscences' (1850); and 'Personal Memoirs and Recollections of Editorial Life' (1852).

Buckingham, William Alfred, American politician: b. Lebanon, Conn., 28 May 1804; d. Norwich, 3 Feb. 1875. He was educated in the common schools; worked on his father's farm; was also a school-teacher, and at Norwich, 1825, began business in dry-goods, becoming later a manufacturer and something of a capitalist. In 1849 he was elected mayor of Norwich, to which office he was repeatedly chosen. For nine years (1858-66) he was governor of Connecticut, and as one of the most efficient of the "war governors" achieved a national fame. He served as United States senator from 1869 till his death. He was active in the temperance cause, and a liberal giver to Yale College and to many benevolent objects.

Buckingham, or Bucks, an inland county, England, bounded north and northwest by Northampton; northeast and east by Bedford and Hertford; southeast by Middlesex; southwest by Berks, and west by Oxford. Its length,

BUCKINGHAM — BUCKLANDITE

north to south, is about 45 miles; greatest breadth, east to west, 23 miles; area, 746 square miles. The vale of Aylesbury, stretching through the centre of the county, and celebrated for its fertility, furnishes rich pasturage for vast numbers of cattle and sheep. The total area under all kinds of crops, bare fallow, and grass is somewhat more than 400,000 acres, of which considerably more than half is in permanent pasture. The chief cereal crops are wheat, barley, and oats, each occupying annually from about 22,000 to 30,000 acres. Between 4,000,000 and 5,000,000 pounds, or about 1,900 tons of butter, are annually made in this county. The breeding and fattening of cattle are largely carried on, Herefords and short-horns being favorite breeds. The manufactures of Buckinghamshire are unimportant. Among them are straw-plaiting and the making of thread lace, wooden articles, such as beechen chairs, turnery, etc. There are also paper-mills, silk-mills, and other manufactories. The mineral productions of this county are of no great importance. The county is watered by the Ouse, the Thame, the Thames, and other streams, and is intersected by the Great Western and Northwestern R.R.'s. Buckingham is nominally the county town, but Aylesbury is the assize town. Buckinghamshire used to contain three parliamentary boroughs, namely, Aylesbury, Buckingham, and High or Chipping Wycombe, which now give name to corresponding parliamentary divisions. The county thus returns three members to the House of Commons. It gives the title of earl to the family of Hobart Hampden. Pop. about 190,000.

Buckingham, a municipal and formerly a parliamentary borough of England, capital of the county of its own name, 50 miles northwest of London, situated on a peninsula formed by the Ouse, which is here crossed by three stone bridges. The town hall and jail are large and commodious buildings. The parish church, erected in 1781, is a spacious structure, with a square tower, surmounted by an elegant spire, and there are also several other places of worship, and a free grammar-school, founded by Edward VI. Malting and tanning are carried on to some extent; and a good deal of business is done in wool and hops. In the vicinity are several limestone quarries, and one of marble. Pop. about 3,500.

Buckingham Palace, a royal palace in London, facing St. James's Park. It is the town residence of the king.

Buckland, Cyrus, American inventor: b. Manchester, Conn., 10 Aug. 1799; d. 26 Feb. 1891. After learning the trade of a machinist, he assisted in building the machinery for the first cotton-mills erected at Chicopee Falls, and became, in 1828, patternmaker in the United States armory, Springfield, where he remained for 28 years, becoming master mechanic. He designed machinery and tools for the manufacture of firearms; remodeled old weapons and designed new ones; perfected a lathe for turning out gun-stocks; invented machines to bore and turn gun-barrels and for rifling muskets, and many other novelties in the manufacture of firearms and ordnance. Much of his machinery was adopted by foreign governments. As he received nothing for his labor at the armory, excepting his salary, Congress voted him

\$10,000 when ill-health compelled him to resign. In all he received from Congress for his inventions \$70,000.

Buckland, Francis Trevelyan, English naturalist: b. Oxford, 17 Dec. 1826; d. London, 19 Dec. 1880. He was the son of William Buckland (q.v.); graduated at Christ Church, Oxford, and having studied medicine in Paris and London, he was for some time house surgeon to St. George's Hospital, when he joined the 2d Life Guards as assistant surgeon, a post which he held for nine years. His strong passion for natural history soon absorbed all his thoughts, and he became a constant contributor to 'Field' and other periodicals. Latterly he devoted himself with enthusiasm to pisciculture, a subject on which he was long the leading authority. His advice on the subject was sought by several foreign governments, and he was the means of introducing salmon and trout into the Australian and New Zealand waters. He was appointed inspector of salmon fisheries in 1867, and his reports as commissioner led to the passing of several useful acts of Parliament. Besides a great quantity of pleasant gossip articles contributed to various periodicals, he published 'Curiosities of Natural History' (1857-72); the 'Logbook of a Fisherman and Zoologist' (1876); a 'Natural History of British Fishes' (1881); and other works.

Buckland, William, English geologist: b. Axminster, Devon, 12 March 1784; d. 15 Aug. 1856. He was educated first at Winchester, afterward at Corpus Christi College, Oxford, took his degree of B.A. in 1803, and obtained a fellowship in 1808. From early childhood he had been familiar with the ammonites and other fossils in the lias quarries near his native town, and with advancing years the bent of his mind to geological pursuits was developed and confirmed. In 1813 he was appointed reader in mineralogy at Oxford, and in 1818 a readership of geology was instituted for him. In 1825 he was presented by his college to the living of Stoke Charity, near Whitchurch, Hants, and the same year he became one of the canons in the Christchurch Cathedral, Oxford. He was one of the eight selected to write the celebrated 'Bridgewater Treatises,' and in 1836 his essay was published, under the title of 'Geology and Mineralogy Considered with Reference to Natural Theology.' In 1845, he was made dean of Westminster, and in 1847 one of the trustees of the British Museum. His papers contributed to various societies and periodicals were very numerous. He was a fellow and twice president of the Geological Society of London, and of the Royal Society from 1818.

Bucklan'dia, a handsome evergreen Javanese and East Indian tree (*B. populnea*), of the natural order *Hamamelidaceæ*, the only species of its genus. It is said to attain considerable height, often more than 30 feet without branches, and occasionally a circumference of more than 20 feet at the height of a man's chest from the ground. Its timber is widely used in the East.

Bucklandite, the name of two minerals: (1) Bucklandite of Hermann, a variety of epidote; (2) Bucklandite of Levy, a variety of allanite distinguished by being anhydrous. It occurs in small black crystals having the form

and physical properties of allanite in an iron mine near Arendal, Norway.

Buckle, Henry Thomas, English historian: b. Lee, Kent, 24 Nov. 1822; d. Damascus, 29 May 1862. He was the son of a wealthy merchant, and received his education partly at home, and partly at Dr. Halloway's School, Gordon House, Kentish Town. His delicate health prevented his remaining long at school, but his love of learning and indefatigable industry as a student supplied any deficiencies in his training, and he was to a great extent self-educated. At an early age he entered his father's counting-house, but he displayed no aptitude for business; and when at the age of 18 his father's death left him an ample fortune, he devoted himself entirely to study. The only thing he allowed to distract him from his more serious pursuits was his favorite game of chess, in which he attained such excellence as to be recognized as one of the first English masters of the game; but even this he gave up when he found it encroached too much on his time. He had formed a plan, to which he dedicated his life, of writing the 'History of Civilization in England' in conformity with certain philosophical principles, and with an exhaustive treatment in regard to details which he deemed indispensable to historical accuracy, which made the work he had undertaken one of almost incalculable magnitude. He only succeeded in finishing two volumes. The first, published in 1858, stated with copious illustrations the plan of the work; the second, issued in 1861, contained a digression on the histories of Scotland and Spain, intended further to illustrate his design, and demonstrate the principles on which it was based. These works gave rise to much controversy, but it has been generally agreed that they exhibit great boldness and originality of design, with profound and accurate scholarship, and possibly also with a good deal of what was the object of the historian's strongest aversion in others, dogmatism. His death occurred when he was on a voyage undertaken for the restoration of his health.

Buckle, a metal instrument consisting of a rim and tongue, forming a clasp, used for fastening straps or bands in dress, harness, etc. In making buckles, both brass and iron are used, and the chief kinds are called tongue, roller, brace, and gear buckles. The use of buckles, instead of shoe-strings, was introduced into England during the reign of Charles II. They soon became very fashionable, attained an enormous size (the largest being called Artois buckles, after the Comte d'Artois, brother of the king of France), and were usually made of silver, set with diamonds and other precious stones. In the latter half of the 18th century the manufacture of buckles was carried on most extensively in Birmingham, there being at one time not less than 4,000 people directly employed in that city and its vicinity, who turned out 2,500,000 pairs of buckles annually. When the trade was at its height, however, fashion changed, and in 1791 buckle-makers petitioned the Prince of Wales for sympathy, on the ground that, owing to the introduction of shoe-strings, their trade was almost ruined. The prince promised to assist them as far as he could by wearing buckles himself, and enjoining his household to do the same; but fashion

was too strong even for him, and before the close of the century, a great staple trade of Birmingham had become extinct, though shoe-buckles are still by no means unknown.

Buckler, a kind of small shield formerly worn on the left arm, a piece of armor varying in form and material, among the latter being wickerwork, wood covered with leather, a combination of wood and metal, etc.

Buckley, James Monroe, American clergyman and editor: b. Rahway, N. J., 16 Dec. 1836. He was educated at Pennington Seminary and Wesleyan University, and studied theology at Exeter, N. H., and in 1858 entered the ministry of the Methodist Episcopal Church. He has had charges at several places, including Detroit, New York, and Brooklyn, the last of which he retained from 1866 to 1880. Since 1880 he has been editor of the *New York Christian Advocate*. He has published 'Two Weeks in the Yosemite and Vicinity' (1873); 'Christians and the Theatre' (1876); 'Oats or Wild Oats' (1885); 'Travels in Three Continents' (1895); 'Extemporaneous Oratory' (1899); and other works.

Buckley, Samuel Botsford, American botanist and geologist: b. Torrey, Yates County, N. Y., 9 May 1809; d. Austin, Texas, 18 Feb. 1884. He graduated from Wesleyan University in 1836. During his travels in the Southern States he investigated the botany, conchology, etc., of those regions, discovering many new species of plants and shells. Among the flora was the new genus *Buckleya*, which was named in his honor. He determined the height of Mount Buckley, North Carolina, and of several other summits. From 1860-1 he was connected with the State survey of Texas and from 1866-7 was State geologist of Texas. He wrote many papers of a scientific nature and a work on the trees and shrubs of the United States.

Buckminster, Joseph Stevens, American clergyman: b. Portsmouth, N. H., 26 Mar. 1784; d. 9 June 1812. His father, Joseph Buckminster, a scholarly and eloquent preacher, sent the son to Harvard, where he was graduated in 1800, afterward becoming a teacher in Phillips Exeter Academy, among his pupils being Daniel Webster. In 1804 he entered upon the work of the ministry as pastor of the Brattle Street Church, Boston, and at once took his place as a writer and preacher of the finest gifts, to grow in power and public esteem until the day of his premature death. He was a member of the Anthology Club of Boston, and a contributor to the 'Monthly Anthology.' His pulpit influence aided to develop a more literary style of sermon, while his oratorical ability was equal to his skill in composition. He was a representative of the Liberal Congregationalism, which, soon after his death, became Unitarian in belief. His works, in two volumes, were published in 1839. See also his 'Memoirs,' by his sister (1851).

Bucknell University, a co-educational institution in Lewisburg, Pa.; organized in 1846, under the auspices of the Baptist Church; reported in 1910: Professors and instructors, 48; students, 703; volumes in the library, over 19,000; grounds and buildings valued at more than \$350,000; endowment, \$425,000; president, John H. Harris, LL.D.

Buckner, Simon Bolivar, American soldier and politician: b. Kentucky, 1 April 1823. He was graduated at West Point in 1844, taught there, as assistant professor, during the next two years, and served in the Mexican war, 1846-8, under Gens. Taylor and Scott. He was brevetted first lieutenant, and also captain, for gallantry at the battles of Churubusco and Molino del Rey. From 1848 to 1850 he served at West Point as assistant instructor in infantry tactics. In 1855 he resigned from the army and engaged in various occupations, civil and military, in Illinois and Kentucky. When the Civil War began he joined the Confederate army as a brigadier-general. Afterward he rose to distinction, attaining the rank of lieutenant-general, and taking a prominent part in several important events of the war, notably in the defense and surrender of Fort Donelson, 16 Feb. 1862. He was one of the pall-bearers at Gen. Grant's funeral in 1885, by the personal selection of the great soldier himself, who had been warmly attached to him for many years. In 1896 he was nominated for vice-president by the National (Gold) Democrats, having previously served a term as governor of Kentucky.

Buckram, a coarse fabric, linen or cotton, sized with glue. It is used in making garments to give them, by stiffening, the form intended, and as a cover in bookbinding.

Buckshot, a leaden shot larger than swan-shot. About 160 or 170 of them weigh a pound. They are especially designed to be used in hunting deer and other large game.

Buckshot War, 1838, a disputed-election case in Pennsylvania, of national importance as bearing on the nature of the "domestic violence," from which the Constitution requires the Federal government to protect the States. As usual, fraud under legal forms was met by retaliation in defiance of them. The legislature that year had to elect a United States senator; and the return of Democratic candidates in Philadelphia gave that party a majority on joint ballot, though the Senate was 22 Whig (Anti-Masonic) to 11 Democratic. But the Democratic congressional candidate in one of the city districts was defeated; his party charged it to frauds in the Northern Liberties district (now in Philadelphia), and the 10 Democratic election judges threw out its entire vote of some 5,000, giving him the certificate of election. At once the seven Whig judges met and gave the certificate not only to their candidate, but to their legislative candidates who were not elected even with the Northern Liberties vote: obviously to fight till their congressman was restored. The secretary of State was chairman of the Whig State committee, received the Whig certificate first (professedly at least), refused to acknowledge any others, and publicly advised his party to claim the election and hold out. Armed crowds of both parties collected at Harrisburg "to see fair play" when the legislature met, 4 December; and for some days the sessions were held with a roaring mob outside. The Whig returns alone were handed in by the secretary of State; the Whig senate organized, and then adjourned on account of the mob; one member is alleged to have threatened them with "ball and buckshot," whence the name. In the Representatives' hall both parties organized and chose speakers, the Whigs, T. S. Cunningham,

and the Democrats, William Hopkins; the former then adjourned, whereupon the latter held the hall with a guard and the Whigs had to meet outside. The Whig governor, Joseph Ritner, called on the State militia to be ready to rescue the capital from a "lawless mob," and appealed to the commandant, at Carlisle, and next to President Van Buren, for help against "domestic violence," which was refused on the ground that this phrase referred only to insurrection against lawful authorities, whereas this was only a political struggle to determine who the lawful authorities were, in which the government could not decently interfere. (The same excuse was afterward made for leaving Kansas at the mercy of the Border Ruffians, though the Federal court put the United States soldiery into their hands.) About 1,000 militia were brought to Harrisburg; but after a fortnight's stay departed, as the city was entirely quiet, and the rival houses holding regular sessions. The cooler Whigs, however, saw that the secretary of State could not justify his assumption of power; enough Cunningham members joined the Hopkins House to give it a majority, and on the 25th the senate acknowledged it as the true one, whereupon the other broke up and its members gradually drifted in—all but Thaddeus Stevens (q.v.), who would not take his seat during the session. The legislature elected as senator Daniel Sturgeon, then State treasurer, who as such refused to honor Ritner's bill for the employment of the militia. See U. S., DISPUTED ELECTIONS IN THE

Buckskin, a soft leather of a yellowish or grayish color, made originally from deer-skin, but now usually from sheepskin. The softness which is its chief characteristic is imparted by using oil or brains in dressing it. The name is also given to a kind of twilled woolen cloth without a pile or "face."

Buckstone, John Baldwin, English actor and playwright: b. London, 14 Sept. 1802; d. 31 Oct. 1879. From 1823 to 1853 he was a well-known London comedian. He became manager of the Haymarket Theatre, and produced nearly 200 plays, which were all successful, largely owing to his knowledge of stage effect and humor. He made a visit to the United States in 1840. Among the best of his pieces are: 'The Wreck Ashore'; 'Victorine'; 'Green Bushes'; 'The Flowers of the Forest'; 'Married Life'; 'Leap Year'; 'Second Thoughts'; and 'Nicholas Flam.'

Buckstone, Lucy Isabella, English actress (daughter of John Baldwin Buckstone): b. 1858; d. London, 17 March 1893. After acting for a time in the provinces, she appeared on the London stage in 1875 in the play of 'David Garrick.' Among her best known roles were those of Annette in 'The Bells' and Lucy Ormond in 'Peril.'

Bucktails, the New York State Democrats opposed to De Witt Clinton, 1812-28; originally the members of the Tammany Society in New York, from the buck's tail worn in their hats as a badge. Their factional opposition to Clinton, under Martin Van Buren and other important local leaders, extended to his advocacy of the Erie Canal, authorized 15 April 1817; the Tammany men were fiercest in opposition to it, and the name "Bucktails" was given to all the anti-Canal Democrats. Clinton was an ungracious

and tactless politician, and in 1824 the Bucktails carried the State and ousted him from the office of canal commissioner; which primitive bit of "spoils," in a community not then hardened to it, created a reaction that gave him two terms more in the governorship. His death in 1828 dissolved his party, and the "Bucktails," under Van Buren and the other members of the "Albany Regency" (q.v.), became the Democratic party in the State.

Buckthorn (*Rhamnus catharticus*), a shrub, native of Great Britain, naturalized in the United States, where it is cultivated for hedges in the Mississippi valley and westward. It is not very common in the States east of the Alleghenies. The stem is covered with a dark-brown bark, and divides into numerous branches with strong spines. It grows to seven or eight feet. The leaves are elliptical and serrated. The male and female flowers are on different plants. The calyx is of a greenish yellow. There is no corolla. The fruit is a round black berry, containing four seeds. It flowers in May, and the seeds ripen in September. The berries are medicinal. They form a powerful purgative, but, being harsh in action, are seldom used in modern practice. The juice of the ripe berries, mixed with alum, forms the sap-green of artists. The bark yields a beautiful yellow dye.

Buckwheat (*Polygonum fagopyrum*, Linn.), a species of grain supposed to be a native of Asia, and called *blé Sarrazin*, or Saracen wheat, by the French, after the Saracens or Moors, who are believed to have introduced it into Spain. It thrives on poor soils, comes rapidly to maturity, and is most frequently planted in tracts that are not rich enough to support other crops. It is extremely sensitive to cold, being destroyed by the least frost, but it may be planted so late and reaped so early as to incur no danger from that source. Its flowering season continues for a long time, so that it is impossible for all the seeds to be in perfection when it is reaped, and the farmer must decide by careful observation at what period there is the greatest quantity of ripe seeds. Buckwheat does not exhaust the soil, and by its rapid growth and its shade it stifles weeds, prevents their going to seed, and leaves the field clean for the next year. As a grain, buckwheat has been principally cultivated for oxen, swine, and poultry; and although some farmers state that a single bushel of it is equal in quality to two bushels of oats, others assert that it is a very unprofitable food. Mixed with bran, chaff, or grain, it is sometimes given to horses. The flour of buckwheat is occasionally used for bread, but more frequently for cakes fried in a pan. In Germany it serves as an ingredient in pottage, puddings, and other food. In the United States it is very extensively used throughout the winter in griddle-cakes. Beer may be brewed from it, and by distillation it yields an excellent spirit. It is used in Danzig in the preparation of cordial waters. Buckwheat is much cultivated by the preservers of game as a food for pheasants. If left standing it affords both food and shelter to the birds during winter. With some farmers it is the practice to sow buckwheat for the purpose only of plowing it into the ground as a manure for the land. The best time for plowing it in is when it is in full blossom, allowing the land to rest till it

decomposes. While green it serves as food for sheep and oxen, and mixed with other provender it may also be given with advantage to horses. If sown in April two green crops may be procured during the season. The blossoms may be used for dyeing a brown color. It is frequently cultivated in this country in the Middle States, and also in Brabant, as food for bees, to whose honey it imparts a flavor by no means unpleasant. The principal advantage of buckwheat is that it is capable of being cultivated upon land which will produce scarcely anything else, and that its culture, compared with that of other grain, is attended with little expense.

Buckwheat-tree, an evergreen shrub of the genus *Cliftonia*, natural order *Cyrillaceæ*; also called *titi*. It is a native of the southern United States, where it is found in the neighborhood of water. It bears fragrant white flowers, followed by drooping fruits, which suggest the name.

Bucolic, a term derived from a Greek word meaning "herdsman." It is equivalent to the word *pastoral*, derived from the Latin, and is applied to pastoral poetry of the kind especially descriptive of rural life as led by cowherds and mountain shepherds. Of this class of poetry Theocritus and Vergil left the highest examples. See PASTORAL POETRY.

Bu'crane, an ornamental design carved in relief on the altars of Greece and Rome. It represented an ox skull with garlands depending. This decoration is sometimes seen as an architectural detail with other animals' heads introduced in place of the original ox-head.

Bucyrus, Ohio, city and county-seat of Crawford County, situated on the Sandusky River and on the Pennsylvania, the Ohio C., and Sandusky division of the Pa. R.R.'s. Stockraising and farming are carried on in the surrounding region and the city is actively engaged in manufacture. Among the products of the mills and shops are machinery, ventilating apparatus, plows, vehicles, and furniture. There are school and county buildings, a reservoir, and waterworks. There is a park in the city, and numerous mineral springs in the surrounding region. Bucyrus was settled in 1818 and incorporated in 1829. Pop. (1910) 8,122.

Bud, a modified shoot in which, owing to the non-development of the axis, the lateral organs become crowded together. It contains the rudiments of future organs, as stems, branches, leaves, and organs of fructification. The usual form of a bud is an elongated ovoid, and according to their position they are described as terminal, that is, formed at the end of a branch, or axillary, that is, produced in the axils of a leaf. Besides the rudimentary organs found in the interior, buds are in cold or temperate climates often covered externally with a viscous and resinous coating, and furnished internally with a downy tissue, destined to defend the enclosed organs from the rigor of winter. No envelopes of this kind are observed on the buds of the greater number of tropical plants. Buds on exogenous plants are in their commencement cellular prolongations from the medullary rays, which force their way through the bark. The cellular portion is surrounded by spiral vessels, and covered with rudimentary

BUD MOTH — BUDAPEST

leaves. When the vascular part of the bud develops the central cellular portion remains as pith, enclosed in a medullary sheath, which isolates it from the parent stem. Thus it remains till the second year. The bud here described, which contains the rudiments of future leaves, branches, etc., is called a leaf-bud. Sometimes more than one bud is found in or near the axil of a single leaf, in which case all but the proper axillary bud are called accessory buds. The buds begin to show themselves as soon as the leaves have taken their full development. They are then very small, as the developed leaves absorb the nutritive juices of the plant, leaving them little nourishment. On the fall of the leaf they enlarge, and take the form they are to retain during winter, in which season they are stationary. On the return of spring they begin to swell, and burst the scales which form their external covering, and the young shoots which these have served to protect now make their appearance. The external scales of the bud are usually deciduous, that is, they fall off when the young shoot appears; sometimes, however, they are persistent. These scales sometimes represent leaf-blades, as in lilac; sometimes stipules, as in the beech; or petioles, as in the horse-chestnut. Flower-buds are produced in the axil of leaves called floral leaves or bracts. They are not capable of extension by the development of the central cellular portion, and instead of the conservative organs of plants, leaves, and branches, they produce the reproductive organs, flowers, and fruit. Perennial herbaceous plants spring from a subterranean bud called the turio, which is developed annually, and from which the new stem is produced. The bulb is a species of bud of this kind. The arrangement of the leaves in a leaf-bud is called its vernation; of the petals and sepals in a flower-bud, its aestivation.

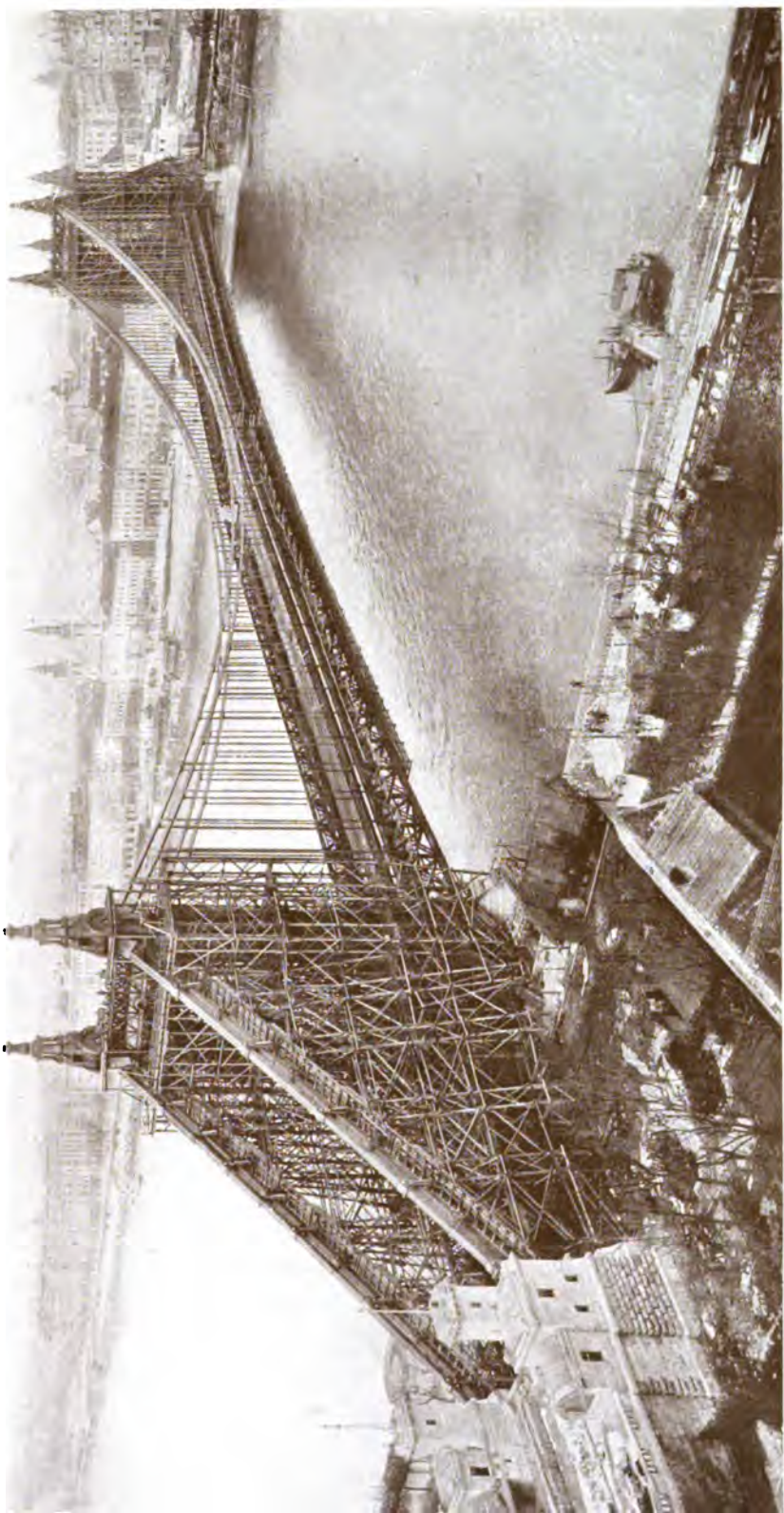
Bud Moth. An apple pest. See **APPLE**.

Budæ'us. See **BUDE, GUILLAUME**.

Budapest, boo'da-pĕst, the united towns of Buda or Ofen, and Pest or Pesth, the one on the right, the other on the left of the Danube, forming the capital of Hungary, the seat of the Hungarian parliament and supreme courts, about 135 miles southeast from Vienna. Buda, which is the smaller of the two, and lies on the west bank of the river (here flowing south), consists of the fortified Upper Town on a hill, the Lower Town or Water Town at the foot of the hill, and several other quarters, including Old Buda farther up the river. Among the chief buildings are the royal castle and several palaces, the arsenal, town hall, government offices, etc.; the Church of St. Matthew, dating from the 13th century, during the Turkish occupation a mosque for 150 years, and recently rebuilt; and the finest Jewish synagogue in the empire. Pest, or the portion of Budapest on the left or east bank of the river, consists of the inner town of Old Pest on the Danube, and a semicircle of districts—Leopoldstadt, Theresienstadt, Elizabethstadt, etc.—which have grown up around it. The river is at this point somewhat wider than the Thames at London, and the broad quays of Pest extend along it for from two to three miles. It is spanned by fine suspension and other bridges. Pest retains, on the whole, fewer signs of antiquity than

many less venerable towns. Its fine frontage on the Danube is modern, and includes the new houses of parliament, opened in 1896, the academy of science, with a library of 180,000 volumes, exchange, custom house, and other important buildings. The oldest church dates from 1500; the largest building is a huge pile used as barracks and arsenal. Other buildings include the old and the new town house, national museum, National theatre, university buildings, various palaces, the Royal Opera House, etc.

Budapest contains the most important of the three universities of Hungary, attended by about 4,500 students, and having over 220 professors, lecturers, etc. Another important educational institution is the technical high schools, with 60 teachers and 1,100 to 1,200 students, and a library of 60,000 volumes. In commerce and industry Budapest ranks next to Vienna in the empire. Its chief manufactures are machinery, gold, silver, copper, and iron wares, chemicals, textile goods, leather, tobacco, etc. A large trade is done in grain, wine, wool, cattle, etc. At Budapest are the largest electrical works in all Europe. Engineers employed there have brought to perfection the science of applying electricity to motors. They constructed there the first successful underground trolley lines. The city contains the important parks of the Stadtwäldchen, about 1,000 acres in extent, and Margaret Island. It is divided into 10 municipal districts, three on the Buda side of the river, and seven on the Pest side. The Elizabeth suspension bridge over the Danube River was completed and formally opened for traffic 10 Oct. 1903. It was named in commemoration of the late Queen Elizabeth of Hungary. The bridge was originally planned in 1893 by the Budapest Board of Trade. It has two piers, one on each side of the river, built on substantial ground. Its clear span over the river Danube is 951½ feet. There are land approaches on each side of the river, each having a length of 40 meters, thus giving the entire bridge a total length of fully 3,014 feet. The two piers have a total height of 212 feet each over the zero level of the water. Both of them are made of steel and rest upon granite foundations. The highest point at the centre of the bridge is 59 feet from the zero level of the river. The bridge has a total width of 59 feet, 36 feet of which is carriageway, and 11½ feet for each of two footways. Budapest is strongly Magyar in character and sentiment, and as a factor in the national life may almost be regarded as equivalent to the rest of Hungary. Old Buda was founded by the Romans about 150 A.D., and was known as Aquinicum. Pest is of much later origin, first being heard of in the 13th century. The citadel of Buda was captured by the Turks after Mohacs in 1526. From 1541 to 1686 Buda was the seat of a Turkish pasha, the Turks being then driven out. The towns were united as one municipality in 1873. It was not until 1799 that the population of Pest began to outdistance that of Buda; but from that date its growth was very rapid and out of all proportion to the increase of Buda. In 1799 the joint population of the two towns was little more than 50,000; in 1890 it was 506,384; in 1900, 732,322.



THE ELIZABETH SUSPENSION BRIDGE AT BUDAPEST.

Buddha, bood'a, or bûd'a (to know, intelligence), the generic name for a deified teacher of the Buddhists. These hold that innumerable Buddhas have appeared to save the world, among them one in the present period, also known as Sâkyamuni, or Saint Sâkya, who is believed by some to have been the ninth incarnation of Vishnu; by others the son of the moon, and regent of the planet Mercury. He was a reformer of Brahminism, introducing a simple creed, and substituting a mild and humane code of morality for its cruel laws and usages. His personal name was Siddhartha, and his family name Gautama; and he is often called also Sakya-muni (from Sakya, the name of his tribe, and muni, a Sanskrit word meaning solitary). His father was king of Kapilavastu, a few days' journey north of Benares. Siddhartha was early filled with a deep compassion for the degeneracy and misery of the human race, and a deep feeling of the vanity of earthly things. His melancholy thoughts would not be stifled in the enjoyments of his father's court: he must find peace for his own soul and bestow it on others. To this end he left his father's court and after having attended the schools of the Brahmins without profit and lived for years a life of solitude and asceticism, he at last, by dint of profound meditation, acquired clear notions on the life of man and his relations to the universe, and found out the true path, which was to lead his fellow-creatures to the goal of life. It was then that he became the Buddha, and began to teach his new faith in opposition to the prevailing Brahmanism. The first place at which he taught, or, in the mystic phrase of Buddhism, "turned the wheel of the law," was Benares. He soon made many converts, especially among the lowly and oppressed, for his teaching was addressed to all alike, without distinction of person or caste. Many of the Brahmins also joined him, wearied with the severe and oppressive observances of their own religion, which contrasted so unfavorably with the simplicity of the new faith. Among his earliest converts were the monarchs of Magadha and Kosala, in whose kingdoms he chiefly passed the latter portion of his life, respected, honored, and protected.

The theory of the "four sublime verities" lies at the foundation of the doctrines of the Buddhists. The first verity is that pain is inseparable from existence, inasmuch as existence brings old age, sickness, and death; the second, that pain is the offspring of desire, and of faults which desire has made us commit in previous states of existence (for Sakya-muni adopted fully the prevailing doctrine of Brahmanism with regard to the transmigration of souls) or in the present; the third verity tells us that existence, and therefore pain, can only cease through Nirvana; the fourth, that in order to attain Nirvana our desires and passions must be suppressed, every obstacle to the extinction of desire must be set aside, the most extreme self-renunciation must be practised, and we must, in short, forget our own personality so far as possible. The last verity is the most important in its practical

application, as pointing out the way to salvation and providing a rule of conduct. The way to salvation consists of eight parts or conditions that a man must fulfil. The first is in Buddhistic language right view; the second is right judgment; the third is right language; the fourth is right purpose; the fifth is right profession; the sixth is right application; the seventh is right memory; the eighth is right meditation. The five fundamental precepts of the Buddhist moral code are not to kill, not to steal, not to commit adultery, not to lie, and not to give way to drunkenness. To these there are added five others of less importance, and binding more particularly on the religious class, such as to abstain from repasts taken out of season, from theatrical representations, etc. There are six fundamental virtues to be practised by all men alike, namely, charity, purity, patience, courage, contemplation, and knowledge. These are the virtues that are said to "conduct a man to the other shore." The devotee who strictly practises them has not yet attained Nirvana, but is on the road to it. The Buddhist virtue of charity is universal in its application, extending to all creatures, and demanding sometimes the greatest self-denial and sacrifice. There is a legend that the Buddha in one of his stages of existence (for he had passed through innumerable transmigrations before becoming "the enlightened") gave himself up to be devoured by a famishing lioness which was unable to suckle her young ones.

There are other virtues, less important, indeed, than the six cardinal ones, but still binding on believers. Thus not only is lying forbidden, but evil speaking, coarseness of language, and even vain and frivolous talk, must be avoided. Buddhist metaphysics are comprised in three theories—the theory of transmigration (borrowed from Brahmanism), the theory of the mutual connection of causes, and the theory of Nirvana. The first requires no explanation. According to the second, life is the result of 12 conditions, which are by turns causes and effects. Thus there would be no death were it not for birth; it is therefore the effect of which birth is the cause. Again, there would be no birth were there not a continuation of existence. Existence has for its cause our attachment to things, which again has its origin in desire; and so on through sensation, contact, the organs of sensation and the heart, name, and form, ideas, etc., up to ignorance. This ignorance, however, is not ordinary ignorance, but the fundamental error which causes us to attribute permanence and reality to things. This, then, is the primary origin of existence and all its attendant evils. Nirvana is eternal salvation from the evils of existence, and the end which every Buddhist is supposed to seek. It is not so easy to determine exactly what this Nirvana means, however; but the best authorities (Burnouf, Turnour, Spence Hardy, Barthélemy Saint-Hilaire, etc.) affirm that it means the complete annihilation of the thinking principle. Sakya-muni did not leave his doctrines in writing; he declared them orally, and they were carefully treasured by his disciples,

and written down after his death. The determination of the canon of the Buddhist scriptures as we now possess them was the work of three successive councils, and was finished two centuries at least before Christ. The religion soon spread through Hindustan, though it was afterward (probably through persecution) entirely banished from it. Many rock temples, inscriptions, etc., testify to its former prevalence in this region. From Hindustan it spread in all directions — to Ceylon, Java, Cochin-China, Laos, Burma, Pegu, Nepal, Tibet, Mongolia, Tartary, China (where Buddha is called Fo), and Japan, in which countries it still prevails. At present it is professed by perhaps a third of the human race.

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Buddhism, Esoteric. See THEOSOPHY.

Buddhist Architecture. See INDIAN ART.

Bud'ing, in gardening, the art of multiplying plants by causing the leaf-bud of one species (or, more commonly, variety) to grow upon the branch of another. The operation consists in shaving off a leaf-bud, with a portion of the wood beneath it, which portion is afterward removed by a sudden jerk of the operator's finger and thumb, aided by the budding-knife. An incision in the bark of the stock is then made in the form of a T; the two side lips are pushed aside, the bud is thrust between the bark and the wood, the upper end of its bark is cut to a level with the cross arm of the T, and the whole is bound up with netting or worsted, the point of the bud alone being left exposed. In performing the operation, a knife with a thin flat handle, and a blade with a peculiar edge is required. The following conditions are essential to the success of the operation: First, the bud must be "ripe," that is, fully formed — which is known by its plumpness and hardness. If too young, it will not succeed, because it has not acquired vitality enough to depend upon its own resources, until that new growth has taken place which attaches it to the stock. If too old, "sprung," or beginning to grow, it is also unfit for use, because the new organs belonging to the young growth need an instant and uninterrupted supply of food, which in the beginning the bud cannot obtain from the branch. Secondly, the bark of the stock must "run freely," that is, must separate readily from the wood below it. This separation is necessary in order that the bud may be inserted beneath the bark; and is always attended by the presence of a large quantity of the viscid

matter called cambium, which is in fact a mixture of young tissue in the act of organizing and of organizable matter. The bud coming in contact with this substance, young and full of vitality, readily forms an adhesion with it, and thus the operation is complete. On this account young branches should always be chosen, since the bark never runs so freely, that is, there is never so great a collection of cambium under it in old branches. Those of the year in which the operation is performed are the best, provided they are advanced toward maturity. Shoots far advanced in a second year's growth are, however, often used, and with success. With regard to the time of performing the operation, autumn is preferred in this country, but it may be practised also in spring. Buds take better in autumn, because the stock has at that period ceased growing, and is chiefly occupied in storing up the organizable material required for the nutrition of the young organs, of which the bud, by the act of insertion, has become one. It ought to be borne in mind that the nearer the constitution of the stock approaches that of the bud, the greater is the success that attends this operation. If they are in any considerable degree dissimilar, the operation becomes precarious; if very different, it is impracticable.

In animals, a form of reproduction, as of the hydra, the sea-anemones, the coral polyps, ascidians, etc. The nature of the process, due to rapid cell-division developed locally, is best seen in the hydra (q.v.), where young hydras arise from protusions, well called "buds," from the side of the parent stock, and later are constricted off and become free individuals. In the corals, as a result of throwing out lateral buds from the base, arises a colony, or compound coral like most of the reef-building forms, such as the brain-coral (Meandrina). In the hydra and other animals the new individual arising by budding becomes free from the parent.

Buddleia, būd-lē'ya, or **Buddlea**, a genus of about 70 species of shrubs or trees of the natural order *Loganiaceæ*, natives of the tropics and warmer temperate regions of the world. A few of the hardiest species, none of which are quite hardy in the northern United States, are cultivated as ornamental plants, for which purpose they are specially fitted by their attractive, usually deciduous, but sometimes almost persistent woolly foliage and panicles and their cluster or racemes of tubular or bell-shaped flowers produced abundantly during the summer. The flowers, which in some species are fragrant, range in color from yellow to red, white to purple, and in some cases have more than one color in individual flowers. They may be propagated from seed or cuttings and are found to thrive in well-drained soil in sunny situations. They are popular in the southern United States and the West Indies.

Budé, Guillaume, gē-yōm bū-dā, French scholar, more generally known under the Latin form Budæus: b. Paris, 1467; d. 1540. He was royal librarian and master of *requêtes*. From his 24th year he devoted himself to study with the greatest zeal, in particular to belles-lettres,

BUDE — BUELL

to mathematics, and to Greek. Among his philosophical, philological, and juridical works, his treatise *'De Asse et Partibus ejus,'* and his commentaries on the Greek language, are of the greatest importance. By his influence the Collège Royal de France was founded. He enjoyed, not only as a scholar, but also as a man and citizen, the greatest esteem. His works appeared at Basel (1557). See E. de Budé, *'Vie de Guillaume Budé'* (1884).

Bude (būd) Light, an exceedingly brilliant light, produced by directing a current of oxygen gas into the interior of the flame of an argand-lamp or gas-burner, by which intense combustion is established and a dazzling light obtained. This plan of lighting was adopted in the House of Commons in 1840 and continued till 1852, when another system of lighting was introduced. It was invented by Mr. Gurney of Bude, in Cornwall, and hence the name.

Budgell, Eustace, English miscellaneous writer: b. Exeter, 19 Aug. 1686; d. London, 4 May 1736. He was educated at Trinity College, Oxford, went to London, and entered the Inner Temple. He was a relative of Addison, who in 1717, when principal secretary of state in England, procured for Budgell the place of accountant and comptroller-general of the revenue in Ireland. He lost these places when the Duke of Bolton was appointed lord-lieutenant, in 1718, apparently through some dispute. He then returned to England, where, in 1720, he lost \$100,000 by the South Sea bubble. In 1733 he commenced a weekly paper, called *'The Bee,'* which was very popular. On the death of Tindal, the author of *'Christianity as Old as the Creation,'* a will was produced by which \$10,000 was left to Budgell. This sum was so disproportionate to the testator's circumstances (his whole estate did not amount to so much), and the legacy so contrary to his known intentions, that suspicions arose respecting the authenticity of the testament; and Budgell's reputation was completely blasted. Ruined in fortune and character, he ended his life by drowning himself in the Thames. He wrote 37 papers in the *'Spectator'* signed X.; also others in the *'Guardian,'* etc.

Budgerigar, the dealer's name for the Australian grass-parakeet (q.v.). This small parrot has become a common cage-bird in all parts of the world, and goes by a great variety of names, among which "zebra," "shell," and "warbling grass-parakeet" are perhaps the most common.

Budg'et, the annual statement relative to the finances of a country, made by the proper financial functionary, in which is presented a balance sheet of the actual income and expenditure of the past year, and an estimate of the income and expenditure for the coming year, together with a statement of the mode of taxation proposed to meet such expenditure. In the United States the budget is in effect made up in the House of Representatives, to which, at the opening of each congressional session, the secretary of the treasury submits a list of estimates of expenditures for the coming year. Upon these the appropriation bills are based by separate committees. The term "budget" however, is not commonly employed in this country. In England the chancellor of the exchequer sub-

mits to Parliament a yearly statement of necessary governmental expenditures.

Budweis, *bood'vis* (Czech Budejovice), a town of Bohemia, on the navigable Moldau, 133 miles northwest of Vienna by rail. It has a cathedral with a detached belfry dating from about 1550, manufactures of stoneware, porcelain, machines, lead pencils, saltpetre, etc., besides a brisk trade in grain, wood, coal, and salt. In its many educational institutions, including two gymnasia, high, agricultural, trade, industrial, and other schools, instruction is given in both German and Bohemian. In the neighborhood is Schloss Frauenberg (1840-7), the seat of Prince Schwarzenberg. Pop. about 39,400.

Buel, Clarence Clough, American editor and author: b. Laona, Chautauqua County, N. Y., 29 July 1850. He was connected with the New York *Tribune* from 1875 to 1881, when he joined the staff of the *'Century Magazine'*; and, in 1883, in conjunction with Robert Underwood Johnson, began the editing of the celebrated *'Century War Articles,'* which were afterward expanded into the notable *'Battles and Leaders of the Civil War'* (1887).

Bu'el, Samuel, American clergyman: b. Troy, N. Y., 11 June 1815; d. New York, 1 Feb. 1891. He was graduated from Williams College in 1833, and from the General Theological Seminary, New York, in 1837. He was rector successively in Marshall, Mich., Schuylkill Haven, Pa., Cumberland, Md., Poughkeepsie, N. Y., and New York until 1866. From 1866 to 1869 he was professor of ecclesiastical history in the Seabury Divinity School, Faribault, Minn., and professor of divinity there, 1869-71, when he was elected to the chair of systematic divinity and dogmatic theology in the General Theological Seminary, a position which he held until his retirement as professor emeritus in 1888. He wrote *'The Apostolical System of the Church Defended, in a Reply to Dr. Whately on the Kingdom of Christ'* (1844); *'Eucharistic Presence, Sacrifice, and Adoration'* (1874); *'A Treatise of Dogmatic Theology'* (1890); and translated F. H. Reusch's *'Conference at Bonn: Proceedings, August 1875, Between Old Catholics, Orientals, Members of the Anglican and American Churches, from Europe and America'* (1876).

Buell, Don Carlos, American military officer: b. Lowell, Ohio, 23 March 1818; d. near Rockport, Ky., 19 Nov. 1898. He was graduated at West Point in 1841, and served in the Mexican war. When the Civil War broke out he was adjutant-general of the regular army, and was made a brigadier-general of volunteers and attached to the Army of the Potomac. In November 1861 he succeeded Gen. W. T. Sherman in command of the department of the Ohio. He resigned from the volunteer service on 23 May 1864, and on 1 June following, also resigned his commission in the regular army. He was president of the Green River (Ky.) Iron Works from 1865 to 1870, when he engaged in coal mining. From 1885 to 1890 he served as United States pension agent at Louisville.

Bu'ell, Marcus Darius, American Methodist clergyman: b. Wayland, N. Y., 1 Jan. 1851. He was graduated at New York University, 1872; studied theology at Boston University,

BUEN AYRE—BUENOS AYRES

and at the universities of Cambridge, England, and Berlin, Germany, being admitted to the New York East Conference of the Methodist Church, 1875. He was pastor at Portchester, N. Y., Brooklyn, N. Y., and Hartford, Conn., from 1875 to 1884, when he was appointed professor of New Testament Greek and exegesis in Boston University. Since 1889 he has been dean of the theological faculty there. He has written 'Studies in the Greek Text of the Gospel of St. Mark' (1890).

Buen Ayre, *bwān i'rá*, or **Bonaire**, a small island off the coast of Venezuela, belonging to the Dutch. It is 50 miles in circumference, and inhabited chiefly by Indians, with a small mixture of Europeans; mountainous; producing a few cattle, goats, large quantities of poultry, and a considerable quantity of salt. It has springs of fresh water. On the southwestern side is a good harbor. Pop. 4,926.

Buena Vista, *bwá'na vēs'tā*, a village of Mexico, seven miles south of Saltillo, where, on 22-23 Feb. 1847, some 5,000 United States troops, under Taylor, defeated 20,000 Mexicans under Santa Anna. The American army engaged at Buena Vista consisted in large part of volunteers, most of whom had no military experience; and on account of the unequal daring and composure displayed by them at different times the battle would have been lost again and again but for the heroic conduct of the regular artillery. The Americans had taken a strong position on the 21st and were attacked on the 22d, though the main battle did not begin till the 23d, continuing with only slight intermission throughout the day. Santa Anna's attacks were successfully repulsed and on the 24th he was compelled to retreat. The American losses were 746 killed and wounded and the Mexican about 2,000. This battle practically closed the campaign in the north. See MEXICAN WAR. Consult Carleton, 'The Battle of Buena Vista' (1848), Howard, 'Gen. Taylor' (1892).

Buenaventura, *bwā-nā-vēn-tū'ra*, a seaport of Colombia, on the Bay of Choco, on a small island at the mouth of the Dagua, 200 miles southwest of Santa Fé de Bogota. It is the port of Santa Fé de Bogota, Popayan, and Cali.

Buendia, Juan, *hoo-ān' bwān'de-ā*, Peruvian general: b. Lima, 1814. He was put in command of the Army of the South in the Chilean war in 1879, and attacked 10,000 Chileans on the heights of San Francisco, 8 November, where he was defeated with terrible loss. He was court-martialed, but freed from blame and afterward served in the defense of Lima.

Buenos Ayres, *bwá'nōs i'rās*, one of the provinces of Argentina, lying west of the La Plata and Atlantic Ocean, and separated from Patagonia by the Rio Negro. The chief rivers are the Paraná, with its tributary, the Plata River, and the Rio Salado. The province presents nearly throughout level or slightly undulating plains, known as the pampas of Buenos Ayres. They are covered with tall, waving grass, which affords pasture to vast numbers of sheep, cattle, and horses. These constitute the chief wealth of the inhabitants; and their products, along with wheat, are the chief exports. The climate is generally healthy. For judicial purposes the province is divided into four dis-

tricts, and for administrative ones into 100. The capital is La Plata. The executive power resides in a governor and vice-governor, indirectly elected for three years, and the legislative power in a Congress, composed of a Chamber of Deputies of 100 members, biennially elected, and a Senate of 50, elected biennially. The Congress sits from 1 May to 31 August. Pop. about 1,500,000.

Buenos Ayres. Federal capital and principal port of importation and exportation of the Argentine Republic, and the largest of all the cities of the southern hemisphere. From its population (over one million inhabitants in 1906) it occupies the second place among the Latin cities of the world, coming directly after Paris. It is situated $34^{\circ} 36' 21'' 4$ latitude south, which in the northern hemisphere corresponds to the latitudes of Los Angeles (California) and Yokohama (Japan); its longitude is $58^{\circ} 21' 33'' 3$, west from Greenwich: it is situated 20 metres above the level of the sea, upon the right bank of the La Plata River, which is at this point about 30 miles wide, and distant 172 miles from its mouth where it empties into the Atlantic Ocean. It is the metropolis, commercially, politically, and socially, of the extreme south of the continent. Distant 5,220 miles from London and 4,370 miles from New York, it is the terminal port for 10 transatlantic lines of steamships which unite it with European ports, and it is also the centre from which radiate 6,600 miles of railroads, which end in Patagonia in the south, and in the west and north connect it with the frontiers of Chile and Bolivia. It is also the principal port for all the river traffic for a distance of 3,400 kilometres (2,250 navigable miles), extending the whole length of the rivers La Plata, Uruguay, Paraná, and tributaries, connecting it with Montevideo, capital of the eastern Republic of Uruguay, and with Asuncion, capital of Paraguay. Its climate is one of the most changeable in the world, though its annual average temperature corresponds to those of Genoa (Italy); San Francisco (California); Tokyo (Japan); Sydney (New South Wales).

General Topography.—The city is spread out upon a plain on the right bank of the Rio de la Plata, 125 miles west of the city of Montevideo, which lies on the north margin of the estuary. Buenos Ayres extends $11\frac{1}{4}$ miles from north to south, and $15\frac{1}{2}$ miles from east to west, with a circumference of more than 38 miles.

The plan of the city is quadrangular, similar to a chess-board. In the central part the streets are 32 feet wide and the blocks are 429 feet in length. By municipal regulations the height of the front of the buildings cannot exceed one and one-third times the width of the street. In 1892 the Avenue de Mayo was completed and opened. This avenue is 100 feet wide and a mile and a half long, and divides from east to west the oldest and most densely populated part of the city. It is well paved with asphalt and has in the centre three safety islands, with double electric light posts, facing each block, and a row of plane trees extending the entire length. The buildings along this avenue vary in materials and in the number of stories. At the extreme eastern end it opens upon the Plaza de Mayo with an area of more than four acres, beautified with trees and flanked with public

BUENOS AYRES.



1. Plaza de Mayo (May Square), Showing City Hall and Catholic Cathedral.

2. Plaza de Mayo (May Square), Showing Government House.

BUENOS AYRES

buildings;—the "Casa Rosada" ("Pink House") or Executive Palace, the old House of Congress, the Commercial Exchange, the Cathedral, the municipal buildings, the "Bank of the Nation," and other establishments of importance. At the extreme western end is the recently inaugurated Palace of Congress, of monumental proportions, which cost \$6,000,000.

The district of the Boca (about 100,000 inhabitants) in the city of Buenos Ayres, upon the left bank of the Riachuelo, and the district of Avellaneda (12,000 inhabitants) in front of Barracas to the south, upon the right bank, in the jurisdiction of the Province of Buenos Ayres, are united by a draw-bridge and other similar devices, and the people living there are for the most part occupied in the traffic of the harbor, and represent a business capital of \$150,000,000 invested in this traffic. Moreover, the railroads to the west and to the south, which assist in this traffic, represent a capital of \$201,500,000.

Harbors, Wharves, Markets, etc.—The location of the city, owing to the shallowness of the river, demanded the construction of an extensive harbor. Its facilities are as follows:—inner harbor, comprising the north and south basins and docks and the Boca del Riachuelo; outer harbor, comprising the outer roads and channels through which shipping enters; the south channel, 11 miles long, having a depth of 17 to 22 feet; and the north channel, with a depth of from 20 to 23 feet. Both channels are 350 feet wide at entrance and marked by buoys.

This harbor was built in 11 years (from 1886 to 1897) and cost \$35,000,000 gold. It covers a superficial area of 165 acres and consists of two canals (about 21 feet deep), one from the entrance and the other from the outlet (both provided with luminous buoys), which nevertheless do not satisfy the demands of traffic; two shipyards, four docks, and two dry docks; 24 warehouses with a capacity, roughly estimated, of 20,000,000 cubic feet, which can hold 24,000,000 tons of merchandise, and which extend for 1½ miles fronting the wharves, the latter having a length of 6 miles (the same length as the harbor of Antwerp). It has grain elevators whose capacity amounts to 200,000 tons. Within the circumference of the harbor are 3½ miles of railroad. The wharf for animals on foot has room for 40,000 sheep and more than 1,500 bees.

The Boca del Riachuelo has a depth of 18 feet and is bordered by wharves for 3 miles, and has a movement of 1,200,000 tons of merchandise per annum.

Facing these wharves on the right bank is the "Central Fruit Market," the largest warehouse in the world; it occupies an area equal to nine square blocks in New York. The cost of its construction was \$4,155,000. It stores annually about 200,000 tons of wool, hides, and other products of the cattle industry. It is the principal exchange for all business pertaining to the exportation of the fruits of the country.

The southern railroad has its own dock, on the right bank of the Boca del Riachuelo, 23 feet deep, with 1½ miles of wharves, for the exportation of agricultural and cattle products from the southern part of the Province of Buenos Ayres.

Commerce.—Compared with the principal

harbors of the world, the harbor of Buenos Ayres stands in eleventh place, and is second after New York in foreign commerce in all America. In 1909 there entered and cleared 4,252 foreign steam and sailing ships, with a total register of 10,367,658 tons. At the time of its greatest activity, the port harbors as many as 1,400 steamships and sailing vessels moving in and out. The general movement of passengers is about 150,000 outgoing and 250,000 arriving, annually, making an increase from immigration of 100,000 persons every year. The harbor of Buenos Ayres receives 84 per cent. of the importations for the entire country, and sends away 51 per cent. of the national exports. About \$17,000,000 are being spent in enlarging and widening this harbor to enable it to meet the expected development of commerce of the city and of the industries of the country.

Parks.—Buenos Ayres has 79 parks and squares, with an area of 2,320 acres, one of the finest park systems in the world; the Zoo is one of the largest and the best kept in the whole continent; the Botanical Garden is only second to Rio Janeiro's; squares, with profusion of flowers and handsome trees, are beautified with monuments to heroes of the Independence.

Schools, Libraries, etc.—As in many other cities the school buildings do not have the needed space for games and outdoor activities such as school gardening, etc. Already it is thought that the school buildings to be erected in the future should be located in the centre of the parks and public gardens, as in Japan. The school buildings in Buenos Ayres, with much ornamented façades, are quite unfitted for their purpose, having not the proper accommodations in the interior; Italian architects imported the scheme of treating the façade as a mere screen, disregarding modern hygienic exigencies for educational plants. There are now about 250 public schools in which 200,000 scholars are enrolled. There are over 3,000 teachers (mostly women) in the elementary grades. The number of pupils from 6 to 14 years of age is over 200,000, there now being only 15 per cent. illiterate against 20 per cent. in 1895. In the secondary institutions of instruction (except the normal) 3,000 pupils were enrolled. The number of attendants in the seven normal schools of the city was 3,000, and a business college counted 700 pupils. The university has 3,000 students. The public libraries were consulted by over 35,000 persons and possessed 50,000 books.

Press.—More than 200 newspapers are published in the city of Buenos Ayres,—most of them in Spanish: but some are in Italian, English, French, Scandinavian, Russian, Hebrew, and Arabic. "La Nacion" and "La Prensa" have a daily circulation of over 100,000 copies and have the most extensive telegraph services in the world. "La Prensa" is a kind of institutional newspaper. The beautiful building, one of the handsomest in the city, is endowed to social services, and contains library, free evening schools for commerce and for music, offices for free medical assistance, free legal aid, free chemical laboratory, etc. "La Nacion" is entering the same line.

Sanitation.—The sanitary system (running water and sewers) is excellent and has cost the city \$46,875,180. When in 1875 these works were proposed, there had been few years that

BUENOS AYRES

the city had not suffered through terrible epidemics, cholera morbus in 1865 and 1873, and yellow fever in 1871. Since 1885, thanks to the extension of these works of sanitation, to the efforts of the Board of Health in the inspection of foods, and the struggle against tuberculosis and other contagious diseases, the mortality has been reduced from 44 per 1,000 in 1875 to 22.7 in 1894 and to 15.2 in 1908. There has likewise been a considerable reduction in the death rate of infants under one year of age, which in 1889 was 195 for each 1,000 born, and dropped to 141 in 1894, to 102 in 1899, and to 83 in 1904. In the same year the proportion in Christiania was 100, 111 in Paris, 146 in London, 162 in New York, 166 in Hamburg, and 202 in Berlin. The birth rate in Buenos Ayres is 33.5 per cent. and has diminished rapidly from 35 per cent. in 1903, 37 per cent. in 1902, 39.5 per cent. in 1901, 41 per cent. in 1899, 44.5 per cent. in 1893 and 46 per cent. in 1891.

The sewage of the city is handled by the circulating or dynamic sewage system. Drainage works costing over \$35,000,000 discharge into the estuary of La Plata near Quilmes, 15.5 miles southeast of Buenos Ayres.

Another question which occupies the Argentine hygienists is to find a type of sanitary dwelling which will correspond to the change of customs and to the increase of population. Buenos Ayres is the only city in the world with buildings suited to a mild climate which suddenly had to face modern conditions demanding a congested population and the rapid distribution of a heavy traffic, resulting from its being an important seaport. As they are now, the city blocks are not adapted to meet these demands. They have an area of more than four acres and there is no provision for an empty space in the centre. Therefore, the city lots are too long, the houses receiving light and air from a court or *patio*, which in the case of a many-story building does not provide for either. Besides, long houses do not afford privacy or comfort and are heated with difficulty—a serious detriment in a city where the temperature falls as low as 28° F., together with great moisture in the air.

Public Utilities.—The principal streets are lighted with electric lights, are well paved with asphalt, blocks of wood and granite, and are kept in good repair, cleaned, and sprinkled. The internal business of the city is very considerable. In 1904 there were 315 miles of street car lines, of which 166 miles were electric and 149 miles were horse-car lines; the latter power is gradually being exchanged for electric traction. During the year 1905 there were constructed 111½ kilometres of electric roads. The street railroads carry about 180,000,000 passengers, there being a vast increase in the last ten years. There are also about 20,000 carts, 5,000 carriages, of which 2,500 are for hire, and 500 automobiles, which are in large demand. The five railroad stations handle about 15,000,000 passengers and 4,000,000 tons of merchandise. The post-office handled 85,000,000 letters and 76,500,000 packages and pamphlets.

Water required for general purposes is drawn from the estuary five miles above the city. The water works consist of two tunnels, subfluvial and subterranean, 18,702 feet in length, with two pumps capable of raising 6,073,320 cubic feet of

water to a height of 49.2 feet every 24 hours. The filtered water is carried to a central reservoir at the highest point in the city. This distributing reservoir is provided with forcing pumps having three distinct flows: there are 12 tanks, elevated in groups one above another at 39.3, 55.7, and 72.1 feet respectively. It is the most noticeable iron construction in the city; 16,000 tons of iron were used in building it. The exterior is of pressed brick and vitrified tiles and presents a very handsome architectural appearance. The annual consumption of water is 11,000,000 gallons or a daily average of 33.5 gallons per capita.

The telephone service is very deficient. It has only 7,000 subscribers and had connections with the cities of La Plata (38 miles), Rosario (186 miles), and by cable with Montevideo (125 miles).

Industries.—Buenos Ayres is not especially industrial. There are not more than 90,000 workmen in its factories and workshops, where they work hides, wood, metals, clay for bricks, chemical products, constructive materials, manufactures pertaining to lights, furniture, carpets and hangings, clothes, preserved foods, etc.; and this production is stimulated by the protection of the custom-house, in spite of which Buenos Ayres is well supplied with articles made in Europe and America. According to the last industrial census taken in the city of Buenos Ayres, there were 8,877 industrial establishments as follows:

Industries	Capital	Value of Output	Employees		Motors—H.P.
			Men	Women	
Food.....	\$8,000,000	\$16,000,000	6,184	234	3,713
Building....	3,900,000	7,500,000	7,873	.....	2,643
Clothing and toilet	8,000,000	14,500,000	10,711	4,739	1,640
Wood, furniture, etc.	3,750,000	6,000,000	6,035	280	1,064
Metals.....	6,350,000	5,000,000	7,930	96	1,976
Arts and ornaments...	1,700,000	2,000,000	1,722	151	283
Graphic arts	3,300,000	3,500,000	3,684	259	882
Textiles and leather....	7,200,000	15,000,000	5,393	5,084	4,315
Chemicals..	1,600,000	3,000,000	1,644	849	787
Various....	5,500,000	18,500,000	4,253	1,383	2,555
Total....	\$49,300,000	\$91,000,000	55,435	13,077	19,858

Banking, Finance, etc.—Buenos Ayres supports 21 banks of discount with a joint capital of \$100,000,000. Of those, ten years ago, 10 were foreign and represented all the principal cities except New York, notwithstanding that in 1905 the business transacted with the United States amounted to \$44,637,901, having increased 110 per cent. in the previous 5 years; all of this business had to be done through London banks. In a year the Bolsa de Comercio (Chamber of Commerce) transacted business to the amount of \$174,061,251, and the Clearing House passed through \$2,875,024,788.35. The municipal taxes amounted to \$7,500,000, 41 per cent. of which is devoted to loans for new undertakings, 29 per cent. for direct taxes, and 11½ per cent. for indirect taxes.

Landed property sells yearly to the average value of \$35,000,000, varying from \$20,000,000 to \$40,000,000 a year. The value of buildings con-

BUENOS AYRES, UNIVERSITY OF—BUFF LEATHER

structed annually amount to \$15,000,000. There are annual transfers of real estate amounting to \$42,240,000. The average of fire losses and insurance paid has not been high. In a single semester the record shows that the Minister of Justice recognized the authorized agents of 55 miscellaneous societies, with a joint capital of \$44,000,000.

Population, Social Conditions, etc.—The census of 1869 gave the population of Buenos Ayres as 187,346 inhabitants, and prophesied 600,000 for 1919; in 1895 it had 663,854 and in December 1909 had reached 1,246,532. The increase has been at the rate of 40 per cent. in a decade (inferior alone to Chicago). Buenos Ayres has more than 440,000 foreign residents, of whom 230,000 are Italians, 105,000 Spanish, 28,000 French, 6,000 English, and 6,000 German. The greater part of the landowners of the Province of Buenos Ayres and the Pampas prefer to live in the city of Buenos Ayres, enjoying the rent of their land or hoping that the improvements on their neighbors' lands will increase the value of their own. In this respect, that province and this territory are to the city of Buenos Ayres what Ireland has been to London. Because of this and because the city is the seat of the national government, also because of the many commercial establishments engaged in foreign trade, Buenos Ayres is a centre, where the light and splendor of a great capital never die out. It has 20 theatres where in an especially interesting season appeared Saint-Saëns, Puccini, Sara Bernhardt, Coquelin, Rejane, Tina di Lorenzo, Jeanne Hading, Novelli, Caruso, etc. Nevertheless, this wealth, which is the result of the absenteeism above referred to, retards the progress of the country districts and gives birth to a close, feudal plutocracy. Such a social condition is not best fitted to call forth a truly democratic public spirit. However, the spirit of association commences to enjoy a broader outlook, there being a constant increase in the number of educational and civic associations whose object is to make all classes participate in social well-being. The charitable institutions are disposed more and more to abandon their cut-and-dried methods, and instead of lessening the effects of poverty, they endeavor to prevent its causes through a collective social crusade, hoping that before long a law against child-labor will be passed and that model reformatories and juvenile courts will be established to better the general condition of children.

There are over 5,000 persons in the asylums. The free municipal lodging house gives lodging and board to 41,578 persons, the Salvation Army to 40,305, the French Charity Association to 5,046. The criminals arrested annually for each 1,000 inhabitants from 15 to 70 years of age, may be divided very nearly as follows:—German, 4.23; Argentine, 8.70; Spanish, 8.26; French, 3.40; English, 4.93; Italians, 6.61; Uruguayan, 8.65. The criminals of the preceding decade were divided according to ages thus: less than 16 years, 8 per cent.; from 16 to 20 years, 17 per cent.; from 21 to 25, 22.5 per cent.; from 26 to 30, 18.7 per cent.; from 31 to 35, 12.9 per cent.; from 36 to 40, 9.1 per cent.; from 41 to 45, 5.2 per cent.; from 46 to 50, 3.2 per cent.; from 51 to 60, 2.4 per cent.; over 60, 0.8 per cent. The number of suicides was 239, the causes being as follows:—family quarrels, 18.5

per cent.; tired of life, 13.4 per cent.; physical suffering, 12.5 per cent.; crossed in love, 5.4 per cent.

In one year there were 929 births for each 10,000 foreign women. That year, for each 10,000 foreign women from 15 to 50 years of age were born 929 children of a foreign mother; and for each 10,000 Argentine women were born 1,026 children, or it may be a share of 1,605 for each 10,000 women of the entire birth rate. Later, these figures decreased to 850, 1,300, and 1,403 respectively. There are about 75 marriages and 150 deaths for each 10,000 inhabitants.

Government.—The communal government of the city is a kind of government by commission, composed of an Intendente and a deliberating council appointed by the national executive authority. The amount of annual expenditures is about \$10,000,000.

As is evident, it can hardly be said that Buenos Ayres enjoys self-government, strictly speaking. Nevertheless the government possesses considerable prestige, resembling in this respect an aristocratic city. For this reason the public employees seek for the reward of public opinion, and it has been said that there is not a city in the world where so much is accomplished for the same amount of money. On the other hand, as a consequence of paternal government, apathy is to be found in furthering official action. The *Asistencia Publica*, or Board of Health, can truly be called the best in the world. The 18 hospitals are well kept, many in very appropriate buildings. The sale of food in the 35 markets of the city is scrupulously controlled.

JUAN A. SENILLOSA,

Former Argentine Consul General to Canada.

Buenos Ayres, University of (Universidad Nacional de Buenos Aires), the national university of Argentina and the largest institution of learning in South America. Its students number nearly 4,364, and its courses cover law and government, mathematics, science, and philosophy.

Buff, a mixed color, something between pale pink and pale yellow. It was adopted by the English Whig party, in combination with blue, as their distinctive color; and, possibly in consequence of that circumstance, the Whig party having been opposed throughout to all the measures of government which led to the American Revolution, was chosen as the national uniform of the Americans at the opening of the Revolutionary War.

Buff Leather, a leather prepared by saturating the hides with some aluminous substance, and afterward with oil. Leather prepared in this way is softer and more flexible than any other kind, and on that account it is much used for soldiers' cross-belts, gloves, and other military accoutrements. Its color is naturally light yellow, but it is in some cases bleached before being used. The buff leather used in former times to make the jerkins, worn under coats of mail to deaden the pressure of the metal on the body, and to prevent any contusion from a blow, was made from the hide of the urus, or wild bull of central Europe, the common name of which was buffe, whence the name of the leather was derived.

BUFFALMACCO — BUFFALO

Buffalmacco, boo-fal-māk'kō (assumed name of BUONAMICO CHRISTOFANI), Italian painter who flourished according to Vasari during the first half of the 14th century. The same authority attributes to him the frescoes depicting the Passion in the hall of the Campo Santo in Pisa, and states that he worked in Arezzo, Florence, Bologna, and Cortona. He is mentioned by Boccaccio in the 'Decameron.'

Buffalo Bill See CODY, WILLIAM F.

Buffalo, N. Y., county-seat of Erie County, the second city in the State and eighth in the United States; situated at the eastern end of Lake Erie and on its outlet the Niagara River. Its centre is 24 miles south of Niagara Falls, and its important suburbs, the Tonawandas, are half-way between. It lies due west 297 miles by rail from Albany and 499 from Boston; northwest 425 miles from New York, and 417 from Philadelphia; about 410 southwest of Montreal; and 540 east of Chicago. It is, therefore, about a midway point from the East to Chicago. It extends about 10 miles along the lake and river front, and half as far east; area, 42 square miles.

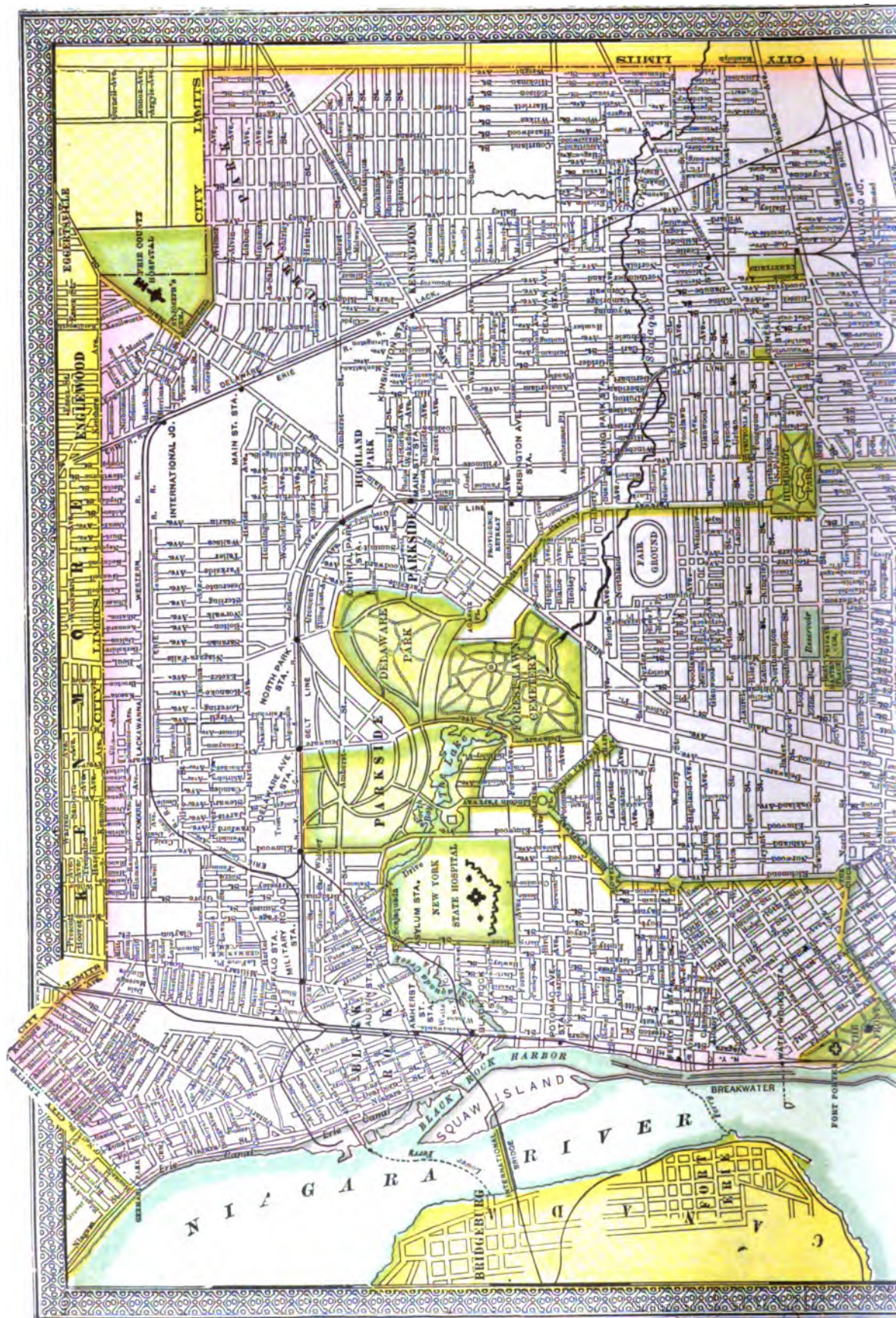
Buffalo, which began at the mouth of Buffalo Creek, has spread mainly north and east up a gradual rise, to a great plateau some 80 feet above the lake and 620 above sea-level. It is laid out in wide rectangular streets, beautifully shaded and decorated with shrubbery, and more completely than any other city in the world: No less than 335 miles of its over 700 miles of streets are asphalted, 105 are stone-paved, and many more are macadamized. The chief business streets are Main, running north and northeast from the lake to the city limits; Delaware Avenue, parallel with it; Niagara, north and northwest along the lake and river front to Tonawanda; and Broadway, which with Genesee and Sycamore widen spoke-like from the heart of the business district around Lafayette and Niagara Squares. Each of these is several miles long. The finest residence streets are Delaware Avenue and North Street, crossing it at right angles a mile north of the centre; they are set with large separate mansions, with great lawns, gardens, and shrubberies, a fashion followed in the new residence streets to the north.

Municipal Service and Improvements.—The street cleaning and sprinkling services, costing \$180,000 a year, and the garbage collection, costing \$110,000, are notably efficient; the sewage collected through over 420 miles of mains is emptied into Niagara River and carried swiftly away; the first public bath house erected in New York State under the law of 1895 was opened here in 1897. All these things, with the cool summer climate which attracts many visitors, enable Buffalo to claim the distinction of being the cleanest and healthiest city in the United States, its death rate in 1901-05 being 15.5 and in 1909 15.2. The waterworks, built in 1888, are supplied from the lake; they cost \$9,100,000, and are owned by the city; the reservoirs have a storage capacity of 200,000,000 gallons a day, the average consumption is about 100,000,000, and there are over 500 miles of mains; the service costs \$650,000 a year. Electric lighting is almost universal in business houses and the finer residences, from the cheap power furnished by Niagara Falls. The police department numbers 785 men, with 13 stations

and a harbor patrol steamer, and costs nearly \$800,000 a year. The fire department has 26 steam fire engines, 6 chemical engines, and 23 hose companies, with three fire boats, the latest systems of storage and signal boxes, and 498 men; the cost is \$675,000 a year. An important municipal improvement has been the transfer of telegraph and telephone, police, and fire-alarm wires, from overhead poles to subways. The street-car service of Buffalo was the first in the United States to equip itself with electricity, and to give free transfers; it has seven companies, and covers over 200 miles of line, extending to all the suburbs, down the river to Niagara Falls, and across it to Canada. More than 50 miles of the track is in the city, which has also a steam belt line of the N. Y. C. along the lake and river front, and west and north to above Delaware Park.

Public Parks and Cemeteries.—The park system includes six large parks of 1,149 acres in all, connected by a magnificent system of boulevards, parkways, speedways, and approaches, covering 224 acres, and 74 acres of minor places and squares. Much the largest is Delaware Park, on the north side, of 362 acres, with a lake ("Gala Water") of 46½ acres in the western part; here and in the adjacent grounds the Pan-American Exposition of 1901 was held. It is continued by Forest Lawn Cemetery of 239 acres on the south—by far the greatest of the 26 cemeteries of the city, and containing the monuments to the Indian chief Red Jacket and to President Fillmore—and by the fine grounds of the State Insane Hospital, with 203 acres, on the west. On the southeast is Humboldt Park of 56 acres. Overlooking the lake at the river entrance is "The Front," a bold bluff 60 feet high, and the site of Fort Porter, where several companies of United States soldiery are stationed. The Parade Ground here has 48 acres, and is a favorite promenade from its superb view. On the south side of the creek are South Park, 155 acres, Cazenovia Park, 106 acres, Riverside Park, 22 acres, and Stony Point Park, 22½ acres, on the lake front. There are several attractive parks and squares in the centre of the city, among them Lafayette, Niagara, Franklin, Washington, and Delaware. Lafayette contains the Soldiers' and Sailors' Monument, costing \$50,000.

Chief Buildings.—Among the many fine structures in the city, the first place must be given to Ellicott Square, the largest and most magnificently equipped fireproof office building in the world; it occupies an entire block, and contains over 400,000 feet of floor space, or over nine acres, with 16 elevators. Of the others, besides churches, cathedrals, and institutional buildings mentioned elsewhere, the most notable are the two handsome buildings preserved from the Exposition—the Albright Art Gallery, and the New York State Building, housing the Buffalo Historical Society; the new Federal Building, containing the post-office and the custom-house, a large freestone structure which cost \$2,000,000; the city and county hall on Franklin Street, of granite, in the shape of a Latin cross, with a tower 245 feet high, completed in 1880 at a cost of about \$1,400,000; the Music Hall and the Board of Trade building, both noble edifices; the State Arsenal; the Old and New Armories; the Masonic Temple and Y. M. C. A. building; the Grosvenor Library; the





MAP OF
BUFFALO

Scale of Feet
0 1000 2000 3000 4000 5000

BUFFALO

Normal School and the three High Schools; the Erie County and Buffalo Savings Banks; the Erie County Penitentiary; and the mammoth grain elevators.

Trade and Commerce.—Buffalo's position as the eastern terminal of the commerce of the Great Lakes, and the distributing point from the East to its ports, has made it the greatest city built up on them except Chicago and Cleveland, and one of the great world-ports in the volume and variety of produce trans-shipped, although ice-bound for one third of the year. In 1910, 3,715 vessels arrived at this port, with a gross tonnage of 7,176,839; and the customs receipts were \$1,420,700. Naturally, its foremost handlings are of western produce, grain, flour, provisions, and live stock; its average annual receipts of grain, though varying with the crop, are about 150,000,000 bushels, of flour 14,000,000 barrels. Next to this is its live-stock business; it handles more horses and sheep than any other American port, and ranks among the first in cattle and swine. It receives some 15,000,000 pounds of fish yearly, largely from Georgian Bay off Lake Huron, and sends it to inland parts not only East, but as far west as the Rocky Mountains. Lumber is another immense interest, its receipts amounting from 150,000,000 to 250,000,000 feet a year; and it receives some 1,500,000 tons of iron ore. Of these last two a large part goes to Tonawanda, whose business, however, is really part of Buffalo's. The coal traffic is also enormous: some 10,000,000 tons are received yearly by rail, two thirds anthracite, of which about 3,000,000, nearly all anthracite, is shipped westward by water. About 100,000 tons of salt are among its exports, and nearly \$10,000,000 worth of packed meat. The total export trade is now over \$16,000,000 a year.

This immense development has been made possible by a vast co-operation of United States, State, and municipality in facilities for handling the business—breakwaters, stone piers, basins, canals, railroads, etc. Originally, as with all the lake ports, the harborage was only the shallow mouth of a small river, Buffalo Creek, navigable now for two miles inward. But the government has built a great series of stone and cement breakwaters, four miles long, costing over \$2,000,000, and forming an inner and an outer harbor, the best on the lakes; this is extended to Stony Point, four miles above the mouth of the creek. The State has built Erie Basin, with a breakwater and stone docks, at the end of Erie Canal just below the mouth of the creek; and the city has deepened the creek and built a ship canal two miles long between it and the lake, one of two such, at the end of which are the Lehigh coal docks. No less than 16 steamship and steamboat lines run from Buffalo to different points on the lakes, besides summer excursion routes. The Welland Canal about 20 miles west, across the neck of land between Erie and Ontario, connects it with the latter and the St. Lawrence. The Erie Canal makes a waterway through the heart of the State to the Hudson River. As to railroads, it is the terminal of the main line or some spur of every trunk road from Philadelphia to Quebec: from the east, in the United States, the New York Central, main line and West Shore; Erie; Lehigh Valley; Delaware, Lackawanna & Western; Pennsylvania; Buffalo, Rochester & Pittsburgh;

Buffalo & Susquehanna; from the west, the Lake Shore & Michigan Southern; Michigan Central; New York, Chicago & St. Louis; Wabash; from Canada, Canadian Pacific; Grand Trunk; Canada Southern. There are 250 passenger trains a day; 700 miles of railroad track within the city limits, and six of the city's square miles are owned by the railroads. To the Canada side at Fort Erie and Bridgeburg there are several ferry lines, and the great International Bridge from Squaw Island to Bridgeburg, completed in 1873 at a cost of \$1,500,000. The internal conveniences for carrying on this traffic are correspondent. There are nearly 50 grain elevators, fixed and floating and transfer towers, with a storage capacity of 28,000,000 bushels, and able to take care of 5,000,000 bushels a day. Some of these are among the largest in the world; the chief one, the Great Northern, with a capacity of 3,000,000 bushels. The first elevator in the world was built here in 1843. The largest coal pocket in the world is that of the D., L. & W. here, 5,000 feet long; the coal docks can handle 29,000 tons a day; the railroad coal-stocking trestles are in the east part. Their stock yards, 75 acres in extent, are in East Buffalo.

Manufactures.—Two great advantages of Buffalo in manufacturing are natural gas, for which the city has laid mains; and the electric power furnished from Niagara, whose tunnels are within 20 miles. At present, about 50,000 persons are employed in manufacturing industries in the city, in 4,000 establishments. By the census of 1905, the figures were: Establishments, 1,538; capital, \$137,023,114; employees, 43,567; wages paid, \$21,621,762; cost of materials, \$88,367,338; value of products, \$147,377,873. The principal industries (1900) except food, mason, and carpenter work, tinsmithing and jobbing, etc., were—wholesale slaughtering and meat packing, \$10,000,000; foundry and machine-shop products, \$7,000,000,—but to this should be added iron and steel, architectural and ornamental iron work, and hardware, \$4,000,000, making a total of \$11,000,000 for iron products altogether, or the most important single branch; the Lackawanna Steel Company, capitalized at \$40,000,000, has the largest and most capacious individual plant in the world, with a separate breakwater a mile long and a capacious private harbor—linseed oil, \$6,500,000, partly used in its \$800,000 of paint making; malt and malt liquors, \$6,500,000; railroad cars, \$5,000,000; soap and candles, \$4,000,000; flour and grist-mill products, \$3,263,697; planing-mill products, \$3,500,000; factory-made clothing, \$3,500,000; chemicals, \$2,000,000; patent medicines and compounds, \$2,000,000; leather and leather goods, \$2,000,000; factory-made furniture, \$2,000,000; besides over \$1,000,000 each of carriages and confectionery, and large quantities of jewelry, saddlery and harness, tobacco products, and other articles, embracing some 200 different industries in all. Buffalo is the eleventh city in the United States in the value of its manufactured products. Total (1905), \$147,377,873.

Finances and Banking.—The assessed valuation of the city has increased in 30 years from about \$38,000,000 to \$312,276,240 in 1910, nearly all real estate, with a tax rate of 21.955. The net public debt was \$24,625,543, with an annual interest charge of about \$700,000; but there is a sinking fund of about \$1,250,000, and the city owns property valued at about \$21,000,000. Also,

BUFFALO

of this debt \$3,754,382 is for water bonds, on which an income is earned. The city expenses was \$7,704,137 for the year 1910. The post-office receipts are over \$1,000,000 yearly, and the internal-revenue receipts about \$2,000,000. There are nine banks of discount (five national), with about \$8,000,000 capital and surplus and \$45,000,000 deposits; two trust companies, with \$1,400,000 capital and surplus; and four savings banks, with over \$35,000,000 deposits and \$6,000,000 surplus.

Churches.—Buffalo is the seat of a Roman Catholic and of an Episcopal bishop, and has two handsome and impressive cathedrals; the Catholic cathedral being a Gothic structure of blue stone trimmed with white, and has a set of 42 chimes. Besides these there are 37 Catholic churches, 13 chapels, and 12 convents; and 171 Protestant, besides 16 missions and chapels, the most numerous being the Methodist Episcopal (24 English, 3 German), Baptist (25 churches and 5 missions), Lutheran (13 German, 5 English, 3 Scandinavian), Presbyterian (18), Protestant Episcopal (16, with 11 missions), and German United Evangelical (15). There are also nine synagogues. Of the church buildings, besides the cathedrals, the most notable are Trinity (Episcopal) and the First Presbyterian.

Charities.—There are 12 children's refuges in Buffalo, and 9 homes and refuges for adults; besides a S. P. C. C. and S. P. C. A., and many religious associations for relieving distress; 18 hospitals, besides the United States Marine Hospital; the Erie County almshouse; lodging and supply stations for the temporary relief of the indigent; a city physician, a district nursing association, and diet kitchens; a German Y. M. A. and the Y. M. C. A.; and a Women's Educational and Industrial Union. Of the children's institutions, the most notable is the free Fitch Institute for poor children, a combined orphanage, crèche—day nursery for children of poor working mothers—training school for nursemaids, etc.; all managed by the Charity Organization Society (organized 1877, the first in the United States), with its home in the building. Of the other institutions, special note may be made of the Buffalo Orphan Asylum, St. John's Orphan Home, the Home for the Friendless, St. Vincent's and St. Joseph's orphanages (Roman Catholic), St. Mary's Asylum for Widows and Foundlings and St. Mary's Institution for Deaf Mutes, the Church Home for Aged Women, and the Ingle-side Home for Erring Women.

Education and Intellectual Associations.—The city in 1910 had 67 grammar schools, with about 142 school buildings, some 1,635 teachers, and total enrollment of about 88,000 pupils; a truant school; 33 Catholic parochial schools, with an estimated attendance of some 20,000; two high schools, third one building—the Central with two annexes, and the Masten Park—with attendance of some 2,400; 25 private schools and academies; and some 20 free kindergartens (partly in connection with the schools), orphan-asylum schools, etc. Of the higher institutions, the chief is Buffalo University, organized in 1845, with affiliated law, medical, and dentistry schools, and a cancer laboratory, 80 professors, and 700 students; others are Niagara University, Canisius' (1870) and St. Joseph's Colleges, the Academy of the Sacred Heart and Holy

Angels' Academy (the last four Catholic), the German Martin Luther Seminary (Evangelical Lutheran, 1854), and the Buffalo College of Pharmacy. All the hospitals have training schools for nurses. The Fine Arts Academy (1862) is located in the public library building; the Buffalo Historical Society (1862), with interesting relics and a large library, in the former New York State Building of the Exposition of 1901, now belonging to the society; the Buffalo Society of Natural Science (1861), with a valuable museum of natural history, in the Buffalo Library building. There are many other art and literary associations; 8 dramatic and 13 musical clubs, besides 23 social clubs; and 8 theatres.

Libraries.—The two chief ones are the Buffalo Public Library, installed in a handsome new building in 1897, with about 175,000 books and 16,000 pamphlets; and the Grosvenor, for reference only, with 65,000 books and 4,000 pamphlets. Besides these, there are many institutional, private, and special libraries: the chief being that of the Historical Society, with 12,000 volumes and 23,000 pamphlets; others are the Lord Library of 5,000 volumes in the same building; the State Law Library, with about 15,000 volumes; the Catholic Institute, with over 11,500 volumes and 500 pamphlets; the Medical Library of the University, with 6,000 volumes; the Lutheran and the German Y. M. A., the Polish and the Adam Mickiewicz, the North Buffalo Catholic Association and the St. Michael's Y. M. Sodality, the Erie Railway Employees' Association, the Harugari, etc.

Newspapers.—In 1910 there were published in Buffalo about 100 periodicals, including 11 dailies, 31 weeklies, 6 Sunday, 2 fortnightly, 35 monthly, and 3 quarterly.

Government.—A four-years' mayor; an alderman from each of the 25 wards, and nine councilmen at large; a city clerk appointed by the council, and health, fire, park, police, and civil-service boards appointed by the mayor; the remaining officials elected by the people.

Population.—In steadiness of rapid growth, Buffalo ranks among the foremost of American cities. It first appears in the census in 1820, with 2,095; 1830, 8,668; 1840, 18,213; 1850, 42,261; 1860, 81,129; 1870, 117,714; 1880, 155,134; 1890, 255,664; 1900, 352,387; 1910, 423,715. It will be noticed that the last 27 years have brought a great increase instead of decrease in its rate of development, and there are no signs of falling off. In 1890 it was eleventh, in 1910 tenth, among our cities. Buffalo has a large foreign population. The following figures are from the last published census, showing the native and foreign birth and descent: The foreign-born population numbered 104,252, or 29.6 per cent.; the native-born of foreign parents, 155,716; and only 90,860 of its people, or little over one fourth, were native whites of native parentage. Of the foreign-born, about 50,000, or nearly half, were German, 13,000 being Polish-German Jews; 11,000 were Irish; but 23,400 were Englishmen from England or Canada, which should be added to the citizenship of English blood. Of all children born in the city, over one-half are of German descent.

History.—The site of Buffalo was originally a basswood forest, amid which an Indian tribe, the Kahkwias, between the Neutrals and the Eries, hunted and fished along the creek; it was

BUFFALO BREAKWATER.



ORIGINAL CRIB SUPERSTRUCTURE IN FOREGROUND; CONCRETE RECONSTRUCTION IN DISTANCE.



STONE BREAKWATER, SHOWING TOP ANGLE STONES.



THE COMPLETED CONCRETE BREAKWATER

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BUFFALO

exterminated by the Iroquois before 1651, and not a single Indian lived there again for more than a century and a quarter. In 1679 La Salle passed the spot in his 60-ton sloop the Griffin, the first sailing vessel ever on Lake Erie, built at Cayuga Creek below. In 1687 the Baron La Hontan recommended it to the French government as the proper site for a fort to command the fur trade down the Niagara, and marked a "fort suppose" on his map; but no attention was paid to him. In 1764 Col. Bradstreet built Fort Erie across the river on his Indian campaign. In 1780 the Senecas, driven from their old haunts by Sullivan's campaign, settled along the creek inland; the next winter an English family captive among them heard them call the creek by a name they translated "Buffalo,"—whether rightly or not is disputed, but probably enough the herds had sought the salt-licks to the east. Their narrative was published in 1784, and in the treaty of Fort Stanwix that year between the English and the Iroquois, the name was used as familiar to the latter. The Indian settlement soon became known as "the village on the Buffalo," currently shortened to "Buffalo village," and presently to "Buffalo," without any official sanction. The land had formed part of the grant of James I. to the Plymouth Company in 1625, and that of Charles II. to the Duke of York in 1664. The consequent dispute between Massachusetts and New York was compromised in 1786, and ultimately the Holland Company of aliens became patentees in trust in 1792, and by legislative permission owners in fee in 1798. Meantime a few settlers had straggled in; a trader named Cornelius Winne in 1789; two families in 1794 and 1796; and in 1797, when there were half a dozen houses, the first white child was born, a girl. A number of others took up residence there by 1803. In that year, by the advice of their surveyor, Joseph Ellicott, the founder of Buffalo, who had assisted his brother Andrew in laying out the city of Washington, and was convinced that here was the site of another great city, the company had him plot a village, and in 1804 sold the first lots. He called it New Amsterdam, and named the streets after the members of the company, but the settlers disregarded all his names and his oxbow line for Main Street, where his own mansion was to be. In 1810 the town of Buffalo was incorporated, including several now separate townships. In 1811 the first newspaper, the *Buffalo Gazette*, was established. In 1813 Buffalo village was incorporated, and received a new charter in 1822. In the War of 1812, after the storming of Fort Niagara by the British in December, a force of British and Indians under Gen. Riall was detailed to destroy Black Rock and Buffalo; on the 29th captured the latter, and the next day burned all but seven or eight houses, coming back 1 January and burning all but three of the rest. The settlers re-occupied their homes to some extent on the 6th, but it was not generally rebuilt till 1815; on 10 April 1814 Gen. Scott put it under military rule. In 1818 the first steamer, Walk-in-the-Water, was launched. For many years, however, supremacy was balanced between it and Black Rock down the river, now the northern part of the city, where at that time was the ferry across the Niagara to the Canada side; but in 1825, after a fierce struggle, the former secured the terminal of the Erie Canal, and in five years

its 2,412 inhabitants had grown to over 8,000, and its future was assured. Long after, however, able capitalists invested heavily in Dunkirk, 48 miles south, in faith that it and not Buffalo was the coming lake port. In 1832, it became a city, and the next year it annexed Black Rock. Buffalo has given two Presidents to the United States, Millard Fillmore and Grover Cleveland, the latter its mayor in 1882. From 1 May to 1 Nov. 1901, the Pan-American Exposition was held here, and on 6 September President McKinley was shot while attending it.

See publications of the Buffalo Historical Society; Smith, 'History of the City of Buffalo and Erie County' (1884); Ketchum, 'History of Buffalo' (1864-5); Powell, 'Historic Towns of the Middle States' (1899).

EDWARD H. BUTLER,
Editor Buffalo Evening News.

Buffalo, a name frequently misapplied to the American bison, but more properly designating a type of heavy oxen, of the tropics of the Old World, long domesticated in the Orient. Buffalo are characterized by their long, angulated horns, broad and flat at the base, so as to form in some cases a shield over the forehead; and by their broad, splay feet, particularly adapted to wading in muddy waters, where they mainly feed on aquatic grasses and other plants. There are three distinct species.

The largest and fiercest buffalo is the black "cape," or South African species (*Bos capensis*) found throughout the entire south of Africa, northward to Abyssinia. It reaches a length of six feet, and in old bulls the relatively short horns join at their bases, so as to form a helmet-like mass, which makes the head almost invulnerable. The horns curve "outward, downward, and backward, and then forward, upward, and inward." This buffalo is bluish-black, and nearly hairless. Its chief enemies are the lion and man, whose combined efforts have greatly decreased its numbers. The buffalo are warned of the approach of danger by the buffalo-birds (q.v.), which constantly hover near them. Another species (*B. pumilus*) is widely scattered throughout the west, and central parts of Africa. It is smaller than the more southern species, and is chestnut in color. The most widely domesticated of the buffalo is that of India (*B. bubalus*), called "arni" (feminine "arna") by the Hindu. It differs greatly in appearance from the African species, having a cow-shaped head, and long, much flattened, triangular horns, covered with transverse wrinkles, which curve regularly outwards and backwards towards the shoulder, and do not form a buckler over the forehead. The bull is ashy-black in color, frequently with white feet, and is smaller than the African buffalo, never exceeding 16 hands at the withers. It is in the wild state an animal of tremendous power and ferocity, and is regarded by sportsmen as one of the most dangerous beasts of the jungle. It has long been employed in the rice-fields of the Orient, as far east as Japan; the ordinary "water-buffalo" or "carabao" of the Philippines is a small variety. It was long ago introduced into Egypt for service in the boggy lowlands of the Delta, and is now extending up the Nile to the lake regions of central Africa. A variety exists in the Niger valley, and another, called "sanga," and distinguished by its very long horns, is do-

BUFFALO BERRY—BUFFALO GRASS

mesticated in Abyssinia. The Indian buffalo is also employed in marshy farming districts in Turkey, Hungary, Italy, and Spain, where it is able to work in ground too wet and soft for the other cattle, and to pasture upon coarse, marsh grasses. Its hide makes good leather, and its milk is excellent, and is greatly used in India for the making of the semi-fluid butter called "ghee."

Buffalo-berry (*Shepherdia argentea*), an American shrub of the natural order *Elæagnaceæ*, cultivated in the Western plains region for its edible berries, and planted for hedges, wind-breaks, and ornament to some extent elsewhere. The plant, which is sometimes tree-form, attains a height of about 18 feet, has thorny stems, small, silvery foliage, yellowish densely fascicled dioecious flowers at the nodes, and globular, one-seeded, yellow or red tart fruits, about the size of currants. Though introduced into cultivation before the black-berry, this plant gained slowly in popularity until the plains region became settled, where, being perfectly hardy, it took the place of tender fruits in the cold and dry West. The fruits make acceptable jellies and preserves, but seem not to be needed where other bush-fruits can be raised. The plants are readily propagated by means of seeds, cuttings, and occasional suckers. They succeed in any good garden soil.

Buffalo-bird, any of several birds which remain about cattle, and feed upon their parasites. Most of them are starlings (q.v.) of plain dark plumage, with the habit of gathering into noisy flocks. Those of South Africa, almost always seen in company with buffaloes and rhinoceroses, belong to the genus *Buphaga*, and are commonly termed "ox-peckers," "beef-eaters," or "rhinoceros-birds." They cluster upon the backs of these animals while they rest or slowly feed, and pick from them ticks and similar pests; and they also serve as watchmen for their hosts, arousing them by their cries whenever anything suspicious happens. The wild and tame buffaloes of the Orient are similarly attended by the starlings of the genus *Eulabes*. These wait about the villages until the cattle come in from pasture at sunset, when the birds throng about them, and relieve them of troublesome insects, to the manifest comfort of the resting cattle. In Africa the larger mammals are frequently served in the same way by certain small, white herons, also called "buffalo-birds" by the colonists.

Buffalo Bug. See CARPET BEETLE.

Buffalo-fish, a large, coarse, fresh-water fish of which there are four varieties; three inhabiting the waters of the Mississippi valley, and one the river Usumacinto in Mexico. The formation of the head suggests the name, for from the nose to the top of the shoulders it has the high, humpy pitch of the bison. In Louisiana they are known as "gourdheads." The common big-mouthed buffalo-fish (*Ictiobus cyprinella*) reaches a length of three feet and a weight of 50 pounds. In the spring freshets of the Mississippi valley, at spawning time, it swims in great shoals on to the flooded marshes, where the receding waters make it an easy victim to the farmers, who kill great numbers of them for fertilizers. In body they are stout and of a dull, brownish-olive hue, not silvery, with dusky fins. The black, or mon-

grel, buffalo-fish (*I. urus*) has a smaller, more oblique mouth, and a much darker color; the fins being almost black. The small-mouthed or white, buffalo-fish (*I. dubalus*) is the most abundant. It does not run so large as the common buffalo, 35 pounds being its limit. In color it is pale, almost silvery. See Jordan and Evermann, 'American Food and Game Fishes.'

Buffalo-gnat, a fly allied to the black-fly (q.v.), *Simulium pecuarum*, of the family *Simuliidæ*, order *Diptera*, a larger and more formidable species than the black-fly of the northern and subarctic regions. It attacks in the lower Ohio and the Mississippi valley various domestic cattle, horses, sheep, poultry, dogs, and cats, and is especially hurtful to mules and horses, killing many. Hogs show at first the effects of the bite but very little; yet large numbers die soon after the attack, while others die about six weeks after the disappearance of the buffalo-gnats; they usually perish from large ulcerating sores, which cause blood-poisoning. Animals bitten by many buffalo-gnats show all the symptoms of colic, and many people believe that these bites bring on that disease. The animal attacked first becomes frantic, but within a very short time ceases to show symptoms of pain, submits passively to the affliction, rolls over and dies; sometimes all within the space of three or four hours. Animals of various kinds become gradually accustomed to these bites, and during a long-continued invasion but few are killed toward the end of it. The larvæ are found more particularly attached to submerged logs, wholly or partly submerged stumps, brush, bushes, and other like objects in the larger creeks and bayous of the region to which they are common. They cluster together, and fastened by the posterior protuberance or by a minute thread, they wander and sway about, but do not venture above the water. When fully grown the larvæ descend to near the bottom of the stream, sometimes 8 or 10 feet, to make their cocoons. The adult fly, on emergence from the pupa, rises quickly to the surface, runs a few inches over the water, and the wings expanding almost instantly it darts away. The time of appearance of the swarms is regulated by the earliness or lateness of the spring, and consequently it is much earlier in the southern parts of the Mississippi valley. As a rule, they can be expected soon after the first continuous warm weather in early spring. In 1885 the first swarms were observed in Louisiana, 11 March, in Mississippi and Tennessee, 1 May, and in Indiana and Illinois, 12 May. Their presence is at once indicated by the actions of the various animals in the field. Horses and mules snort, switch their tails, stamp the ground, and show great restlessness and symptoms of fear. If not harnessed to plow and wagon they will try to escape by running away. Cattle rush wildly about in search of relief. Consult: Osborn, 'Insects Affecting Domestic Animals' (Bulletin 5 n. ser. United States Department of Agriculture, Division of Entomology, 1896).

Buffalo Grass, a strong-growing North American grass (*Tripsacum dactyloides*), so called from forming a large part of the food of the buffalo, and said to have excellent fattening properties; called also gama grass.

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BUILDING OF THE BUFFALO HISTORICAL SOCIETY.

BUFFALO HISTORICAL SOCIETY — BUFFET

Buffalo Historical Society, Buffalo, N. Y. Foremost among institutions of its kind west of New England and the older Atlantic seaboard cities is the Historical Society of Buffalo, N. Y. Founded in the spring of 1862, Millard Fillmore was its first president; and it was at his suggestion that 50 citizens of Buffalo agreed to pay \$20 each per year for five years, thus founding the first maintenance fund of the institution. In President Fillmore's inaugural address, 2 July 1862, the principal objects of the society were stated to be to "discover, procure and preserve whatever may relate to the history of Western New York in general, and of the City of Buffalo in particular." For many years the society occupied various leased quarters with its small museum and library, and its progress was slow; but throughout its more than forty years of existence it has always included among its members the most substantial and representative families of Buffalo. From 1887 to 1902 the society occupied rooms in the Buffalo Public Library building. The need of a building of its own had long been apparent. The nucleus of a building fund had been formed by a gift of \$5,000 from the Hon. James M. Smith, and various building projects had been under consideration, when, in 1900, legislation incident to the construction at Buffalo of a building for New York State at the Pan-American Exposition, opened the way for securing a permanent and worthy home for the society. Through the efforts of Senator Henry W. Hill, aided by Wilson S. Bissell, Andrew Langdon and others, a bill was enacted which enabled the State to expend \$100,000, out of its exposition appropriation of \$300,000, toward the erection of a permanent building, and also providing for adding thereto \$25,000 from the City of Buffalo, and funds from the Historical Society; said building to be placed on park lands, and at the close of the exposition to become the property of the Historical Society, the city being bound to make an annual appropriation toward its maintenance. Under this agreement a building was erected in Delaware Park, at a cost of some \$200,000. The only permanent building connected with the Pan-American Exposition, it has the added interest of being the scene of President McKinley's last public reception, 5 Sept. 1901, prior to that held the next day in the Temple of Music at which he received the wound from which he died, 14 September.

The Historical Society building stands in a beautiful and easily accessible site in Delaware Park, the principal park of Buffalo. It is 130 by 80 feet in dimensions, 50 feet high, perhaps the most notable example in America of the pure Doric order of architecture. It is of white marble, the northern facade faced with three-quarter columns, the south side having a portico 61 by 17 feet, embellished by 10 Doric columns and approached by marble steps 40 feet in width. The columns are of the same proportion as those of the Parthenon, 3 ft. 6 in. in diameter at the base. Within, the chief structural material is black marble. Situated on sloping ground, the edifice has three available floors, the basement being for the most part but little below the ground level. In the middle of the main floor is the grand hall, two stories high, and lighted, as is the upper floor, by side windows and skylights. The library, lecture hall and

administrative offices are on the main floor, the museums and portrait galleries above. A notable feature of the building is the massive bronze doors, presented by Andrew Langdon; the design by J. Woodley Gosling, the sculptural work by R. Hinton Perry; the principal panels bear female figures typifying "History" and "Ethnology," the bronze transom containing a group showing "Science" and "Art." In the Central Hall is a bronze statue of Lincoln, Charles H. Niehaus, sculptor, a gift to the Society from the Lincoln Birthday Association of Buffalo, now affiliated with it.

Notable features in the museum include the Dr. James coin collection, valued at \$15,000; the Dr. Jos. C. Greene collection of Egyptian and Oriental articles, casts, etc.; the Cottier, Scoville and other Indian collections, the Atkins Alaska collection; the Civil War and Lincoln collection of Julius E. Francis, founder of the Lincoln Birthday Association; and many relics of the pioneer days in Western New York, and on the Great Lakes. Many articles formerly belonging to President Millard Fillmore are here shown, as are relics of Lincoln, Grant, other Presidents and famous men.

The Historical Society library (13,000 volumes, 8,000 pamphlets) is a free reference library. It includes the special collection known as the Dr. John C. Lord library, owned by the City of Buffalo but cared for by the Historical Society; and the private library of Mrs. Millard Fillmore. The Society is also rich in manuscript material, which is being drawn on for its annual volume of publications. (Vol. V., 8vo. pp. 546, 1902). Besides its meetings, lectures and receptions for members, the Society makes its possessions and facilities available free to the public, by means of popular lectures in its own lecture hall on Sunday afternoons, talks and various exercises for clubs and school classes, etc., the aim of the management being to make it as useful as possible to the community. It has a membership of upwards of 700, of which 410 are resident, paying \$5 per year, 140 life members, fee \$100, the rest honorary and corresponding.

ANDREW LANGDON,
President Buffalo Historical Society.

Buffer, any apparatus for deadening the concussion between a moving body and the one on which it strikes. In the United States the buffers used on passenger cars are composed of a head, bar and stem and are placed at the centre of each end of the car. On English railways they are placed in pairs at each end, and are fastened by rods to springs under the framework to deaden the concussions caused when the velocity of part of the train is checked.

Buffet, búf-fā', anciently a little apartment, separated from the rest of the room, for the disposing of china, glass, etc. It is now a piece of furniture in the dining-room, called also a side-board, for the reception of the plate, glass, etc. In France many mansions have a detached room called *buffet*, decorated with pitchers, vases, fountains, etc. The word is very commonly applied to the space set apart for refreshments in public places.

Buffet, bú-fā', Louis Joseph, French politician: b. Mirecourt, Vosges, 26 Oct. 1818; d. 1898. In 1848 he was elected to the Chamber of Deputies from the Vosges, and held the po-

sition of minister of commerce and agriculture under the presidency of Louis Napoleon. He then took a prominent part in the "Tiers Parti," which sought to join liberal reforms to loyalty to the government, later becoming its leader. He became a member of M. Emile Ollivier's cabinet in January, 1870, occupying the portfolio of minister of finance, but after only three months' service resigned. In 1871 he was again elected to the National Assembly, of which he was elected president to succeed M. Jules Grévy, 4 April 1873. In 1875 he formed a new cabinet, becoming himself vice-president of the council and minister of the interior, but owing to his having made himself unpopular with the members of his own party, he failed of re-election to the Assembly, and resigned his seat in the Cabinet in 1876. He was, however, in June of the same year elected a life member of the Senate.

Buffington, Adelbert Rinaldo, American military officer: b. Wheeling, W. Va., 22 Nov. 1837. He was graduated at the United States Military Academy in 1861; entered the ordnance department; was promoted colonel in 1880, and became chief of ordnance with the rank of brigadier-general, 5 April 1899. He had command of the National Armory in 1881-92; is the inventor of a magazine firearm, carriages for light and heavy guns, and parts of models of 1884 Springfield rifles; introduced gas forging furnaces and improved methods in the Springfield armory; and originated the nitre and manganese method in use there for bluing iron and steel surfaces of small arms.

Bufflehead, a small plump duck of American inland waters (*Charionetta albeola*), remarkable for its beauty of coloring. It is about 13 inches in length, and the plumage of the drake is black and white, with the crested head, shaped like a puff-ball, rich, silky, changing green. The female is smaller, and more protectively colored in a dull-brown plumage, with white markings. Its food consists of larvæ, shells, seeds, etc., and it frequents gravelly shores and wooded ponds, breeding in holes of trees and burrows, from the great lakes northward to the Arctic Circle. It lays about 12 large, dark-colored eggs. It is of small value to the sportsman, and requires little skill in shooting, except when on the wing, at which time it is remarkable for the speed with which it flies, and the peculiar whistling sound of its wings. It is sometimes called "butterball," because of its roundness, and "spiritduck," a name derived from the Indians, owing to its faculty for vanishing and reappearing from the surface of the water with amazing skill.

Buffon, George Louis Leclerc, zhòrzh loo-è le-klâr bü-fôn (COMTE DE), French naturalist of distinction: b. Montbard, Burgundy, 7 Sept. 1707; d. Paris, 16 April 1788. He received from his father, Benjamin Leclerc, counselor to the parliament of his province, a careful education. Chance connected him at Dijon with the young Duke of Kingston, whose tutor, a man of learning, inspired him with a taste for the sciences. They traveled together through France and Italy, and Buffon afterward visited England. In order to perfect himself in the language without neglecting the sciences, he translated Newton's 'Fluxions,' and Hales' 'Vegetable Statics.' After some time he pub-

lished some works of his own, in which he treated of geometry, natural philosophy, and rural economy. He laid his researches on these subjects before the Academy of Sciences, of which he became a member in 1733. The most important were on the construction of mirrors for setting bodies on fire at a great distance, as Archimedes is said to have done, and experiments on the strength of different kinds of wood, and the means of increasing it, particularly by removing the bark of the trees some time before felling them. Buffon, in his earlier years, was animated only by an undefined love of learning and fame, but his appointment as superintendent of the Royal Garden (now the Jardin des Plantes), in 1739, gave his mind a decided turn toward that science in which he has immortalized himself. Considering natural history in its whole extent, he found no works in this department but spiritless compilations and dry lists of names. There were excellent observations indeed on single objects, but no comprehensive work. Of such a one he now formed the plan, and to aid him in this, by examining the numerous and often minute objects embraced in his plan, he associated himself with Daubenton, and after an assiduous labor of 10 years, the two friends published the three first volumes of the 'Natural History'; and, between 1749 and 1767, twelve others, which comprehend the theory of the earth, the nature of animals, and the history of man and the viviparous quadrupeds. The most brilliant parts of them, the general theories, the descriptions of the characters of animals, and of the great natural phenomena, are by Buffon. Daubenton limited himself to the description of the forms and the anatomy of the animals. The nine following volumes, which appeared from 1770 to 1783, contain the history of birds, from which Daubenton withdrew his assistance. Buffon published alone the five volumes on minerals, from 1783 to 1788. Of the seven supplementary volumes, of which the last did not appear until after his death in 1789, the fifth formed an independent whole, the most celebrated of all his works. It contains his 'Epochs of Nature,' in which the author, in a style truly sublime, and with the triumphant power of genius, gives a second theory of the earth, very different from that which he had traced in the first volumes, though he assumes at the commencement the air of merely defending and developing the former. This great labor, with which Buffon was occupied during 50 years, is, however, but a part of the vast plan which he had sketched, and which has been continued by Lacépède in his history of the different species of cetaceous animals, reptiles, and fishes, but has remained unexecuted as far as regards the invertebrate animals and the plants. There is but one opinion of Buffon as an author. For the elevation of his views, for powerful and profound ideas, for the majesty of his images, for noble and dignified expression, for the lofty harmony of his style in treating of important subjects, he is perhaps unrivaled. His pictures of the sublime scenes of nature are strikingly true, and are stamped with originality. The fame of his work was soon universal. It excited a general taste for natural history, and gained for this science the favor and protection of nobles and princes. Louis XV. raised the author to the dignity of a count, and D'Argvil-

Hers, in the reign of Louis XVI., caused his statue to be erected, during his life, at the entry of the Royal Cabinet of Natural Curiosities, with the inscription 'Majestati naturæ par ingenium.' The opinions entertained of Buffon as a natural philosopher and an observer have been more divided. Voltaire, D'Alembert, Condorcet, have severely criticised his hypotheses and his vague manner of philosophizing from general views. But although the views of Buffon on the theory of the earth can no longer be defended in detail, he will always have the merit of having made it generally felt, that the present state of the earth is the result of a series of changes which it is possible to trace, and of having pointed out the phenomena which indicate the course of these changes. His theory of generation has been refuted by Haller and Spallanzani, and his hypothesis of a certain inexplicable mechanism to account for animal instinct is not supported by facts; but his eloquent description of the physical and moral development of man, as well as his ideas on the influence which the delicacy and development of each organ exert on the character of different species of animals, are still of the highest interest. His views of the degeneracy of animals, and of the limits prescribed to each species by climates, mountains, and seas, are real discoveries which receive daily confirmation, and furnish to travelers a basis for their observations, which was entirely wanting before. The most perfect part of his work is the 'History of Quadrupeds'; the weakest, the 'History of Minerals.' Buffon was of a noble figure, and of great dignity of manners. His conversation was remarkable for a simplicity which strikingly contrasted with the style of his writings. The best edition of his 'Natural History' is that published from 1749 to 1789, in 36 volumes.

Buffoon (Italian Buffone), a comic singer in the opera buffa, or the Italian intermezzo. The Italians, however, distinguish the buffo cantante, which requires good singing, from the buffo comico, in which there is more acting. Buffoonery is the name given to the jokes which the buffoon introduces. The word is no doubt borrowed from the Low Latin, in which the name buffo (checked) was given to those who appeared on the theatre, with their cheeks puffed up, to receive blows on them, and to excite the laughter of the spectators. Afterward the name came to signify a mimic, a jester in general.

Bufo, būfō, a genus of batrachians, the type of the family *Bufo*nidae. The body is inflated, the skin warty, the hind feet of moderate length, the jaws without teeth, the nose rounded. At least 20 species are known.

Bufoⁿite, literally, toad-stone; a name given to the fossil teeth and palatal bones of fishes belonging to the family of *Pycnodonts* (thick teeth), whose remains occur abundantly in the Oölitic and Chalk formations. The term bufoⁿite, like those of serpents' eyes, batrachites, and crapaudines, by which they are also known, refers to the vulgar notion that those organisms were originally formed in the heads of serpents, frogs, and toads.

Buford, John, American soldier: b. Kentucky, 1825; d. Washington, D. C., 16 Dec. 1863. He was graduated at West Point in 1848; was appointed to the 1st Dragoons, and served in the Sioux expedition, 1855, in the Kansas disturb-

ances of 1856-7, and in the Utah expedition, 1857-8. On 12 Nov. 1861 he was appointed major in the inspector-general's corps, attached to Gen. Pope's staff, 26 June 1862, made a brigadier on 27 July, and commanded a cavalry brigade under Hooker in the northern Virginia campaign. He was chief of cavalry in the Maryland campaign, and succeeded Gen. Stoneman on McClellan's staff. He took part in the engagement at South Mountain, Antietam, Fredericksburg, and Beverly Ford; and at Gettysburg began the attack before Reynold's arrival on 1 July, and rendered important services at Wolf's Hill and Round Top. After the engagement at Culpeper he pursued the enemy across the Rapidan, and cut his way to rejoin the army north of the Rappahannock. His coolness, fine judgment, and splendid courage were notable, and in a few months he acquired an influence over men as remarkable as it was useful. His military sagacity was far-reaching and accurate, and made him one of the most trusted and respected officers in the service, and his death, caused by disease contracted during months of active service and constant exposure, was widely lamented in the army. A major-general's commission reached him the day he died, and a monument to his memory was placed on the Gettysburg battlefield in 1895.

Buford, Napoleon Bonaparte, American soldier: b. Woodford County, Ky., 13 Jan. 1807; d. 28 March 1883. He was graduated at West Point, 1827, did garrison duty in Virginia and Maine as second lieutenant in the 3d Artillery, and was assistant professor of natural and experimental philosophy at the military academy, 1834-5, when he resigned his commission, became an engineer in the service of the State of Kentucky, 1835-42, and a merchant and iron founder at Rock Island, Ill., 1843-61, being president of the Rock Island & P. Ry, 1857-61. He entered the Civil War as colonel of the 27th Illinois Volunteers, took part in the battle of Belmont, 7 Nov. 1861, the attack on Island No. 10 in the Mississippi River, March-April 1862, captured Union City, Ky., 31 March 1862, took part in the expedition to Fort Pillow, the siege and battle of Corinth, and the siege of Vicksburg, February 1863. On 24 Aug. 1865, he was mustered out of service with the rank of brevet-major-general of volunteers, conferred for gallant and meritorious services during the Rebellion. He was special commissioner of Indian affairs during 1868, and for inspecting the Union Pacific Railroad, 1867-9. During the negotiations after the battle of Belmont the Confederate Gen. Leonidas Polk wrote of Buford, whom he had known at West Point: "He is as good a fellow as ever lived and most devotedly my friend—a true Christian, a true soldier, and a gentleman every inch of him."

Bug, an insect of the order *Hemiptera*. Bugs are characterized by the beak-like sucking mouth-parts, composed of the mandibles and maxillæ, which are ensheathed by the large expanded labium; by the free, large prothorax, the usually angular short body, and the irregularly veined wings, the veins being but few in number, while the fore wings are often half coriaceous and thick. The metamorphosis is incomplete. There are many wingless parasitic forms, and many aquatic species.

The triangular head is nearly always sunken into the prothorax, and is small in proportion to the rest of the body; the eyes are small, nearly globular, and very prominent, and the three ocelli are set far back, while the short, bristle-like, or filiform antennæ, with from 5 to 13 or more joints, are inserted below and far in advance of the eyes, so that the front is broad and flat. The parts of the mouth form a four-jointed, solid, hard beak. The mandibles and maxillæ are long and style-like, the latter with out palpi; they are ensheathed at their base by the canaliculate labium, which has obsolete palpi. The labium is well developed, being generally acutely triangular. The thorax is like that of beetles, the prothorax being broad above, and the wings, when folded, concealing the rest of the body. The legs are situated close together, with coxæ and trochanters very similar to those of the *Coleoptera*. The body is usually very flat above, or, in the more or less cylindrical species, somewhat broad and flat. The body is less concentrated headwards than in the *Coleoptera*, though much more so than in the *Orthoptera*, and in this respect, as well as in other essential characters, the group is intermediate between these two orders. Both pairs of wings are very equal in size and alike in shape, except in the higher families, where they are very unequal, the hinder pair being very small.

The legs are slender, and often very long, owing to the great length of the femora and tibiae, while the tarsi, like those of the lowest *Coleoptera*, are two- or three-jointed. The abdomen has six to nine segments apparent, though the typical number is 11. The stigmata are very distinct, being often raised on a tubercle. On the basal ring of the abdomen are two cavities in which are sometimes seated vocal organs, as in the male cicada, and in the metathorax of some species are glands for secreting a foul odorous fluid. In the *Cicadida* and *Phytocoris* the ovipositor is perfect and much as in the saw-flies and wasps.

The active nymphs of the *Hemiptera*, like those of the locusts, resemble closely the imago, differing mainly in possessing the rudiments of wings, which are acquired after the second molting. After two changes of skin (four in all) they assume the pupa state, which differs mainly from that of the larva in having larger wing-pads. While the development of the imago ordinarily occupies the summer months, in the *Aphides*, it takes but a comparatively few days, but in the 17-year cicada as many years as its name indicates. An exception to this mode of development is seen in the nymph of the male coccus, which, somewhat as in the higher orders, spins a silken cocoon, and changes into an inactive pupa. Apteroous individuals, especially females, sometimes occur, especially in the aquatic *Hydrometra*, *Velia*, and *Limnobates*, and in many other genera the hind pair of wings are often absent. There are about 50,000 species living and fossil. Some species are of great size, especially the *Hydrocores*, a division containing the aquatic genera, *Velia*, *Nepa*, *Belostoma*, and *Notonecta*, and which first appeared in the Jurassic formation. But the oldest known fossil insect (*Protocimex silurica*) was apparently a bug; traces of one wing having been found in the Upper Ordovi-

cian beds of Sweden. Consult: Packard, 'Guide to Study of Insects' (1889); 'Entomology for Beginners' (1899); Comstock, 'A Manual for the Study of Insects' (1895); Sharp, 'Insects' (1899).

Bug, two rivers in European Russia. One rises near the confines of Volhynia, in the northwest of government Podolsk, and proceeds first east and then southeast to Oliviopol, where it enters government Kherson, which it traverses almost centrally from north to south, and falls into the estuary of the Dnieper, near Kherson. Its chief affluents are the Ingul, Balta, Tcherthal, and Solonicha. It has a course of 500 miles, but its navigation is greatly obstructed by rocks and sandbanks. The second river rises in Galicia and joins the Vistula at the fortress of Novogeorgiesk, about 20 miles north-northwest of Warsaw. It is navigable for nearly 300 miles.

Bugason, boo-ga-sōn', Philippines, a town on the island of Panay. Pop. estimated about 15,000.

Bug'bane, a genus of herbs (*Cimicifuga*), of the natural order *Ranunculaceæ*, tall, perennial plants, of which some 10 species are natives of the northern temperate regions, and are often planted, in spite of their disagreeable odor, for ornamental purposes in hardy borders in exposed places or in partial shade. The species have large deccompound leaves, and racemes of white flowers, which appear during summer and early autumn. In some species the fruits are attractive in appearance. One species, black cohosh, or black snakeroot (*C. racemosa*) is used in domestic and rural medicine as an infusion for various ailments.

Bugeaud de la Piconnerie, Thomas Robert, tō-mā rō-bār bū-zho-dé-la-pē-kōn-è-rē (Duc d'Isly), marshal of France: b. Limoges, 15 Oct. 1784; d. Paris, 10 June 1849. He belonged to an Irish family which had settled in France with James II. on his abdication. He entered the army in 1804 as a grenadier, was corporal at Austerlitz, made the campaigns of Prussia and Poland, and was wounded at Pultusk in 1806. He afterward went into Spain as lieutenant adjutant-major, gained new promotion, and remained with the army of Aragon till 1814. During these long wars he repeatedly distinguished himself, and received honorable mention from Suchet, his commander-in-chief. On the restoration of the Bourbons he gave in his adhesion to them; but on the landing of Bonaparte, followed the general example by deserting to his old master. After the revolution of 1830 he was appointed *maréchal de camp*, and in 1831 obtained a seat in the Chamber of Deputies, where he often displayed great good sense, though in a style of oratory so blunt and rustic as occasionally to excite the risibility of his opponents. He was afterward sent to Algeria, where he gained many advantages over the Arabs, and showed himself possessed of the kind of talents necessary to cope successfully with them and their celebrated leader, Abd-el-Kader. On the revolution of 1848, it is said that, if permitted, he would have effectually put down the insurgents and secured the throne to Louis Philippe. He gave in his adhesion to the republic, but re-

BUGENHAGEN — BUGLOSS

remained unemployed. He was better received by President Louis Napoleon, who appointed him commander-in-chief of the army of the Alps.

Bugenhagen, Johann, called POMERANUS, yō'hān po-mēr-ān'ūs boo-gēn-hā'gēn, or DOCTOR POMMER, German reformer: b. Stettin, 1485; d. Wittenberg, 20 April 1558. He fled from his Catholic superiors to Wittenberg in 1521, where he was made, in 1522, professor of theology. Luther derived assistance from his profound exegetical learning in preparing his translation of the Bible. In 1525 he gave occasion for the controversies about the sacrament, by a work against Zwinglius on the communion. He acquired more reputation by his 'Interpretatio in Librum Psalmorum' (1523). He effected the union of the Protestant free cities with the Saxons, and introduced into Brunswick, Hamburg, Lübeck, Pomerania, Denmark, and many other places, the Lutheran service and church discipline. For the Lower Saxons he translated the Bible into Low German (1533). He was a faithful friend to Luther, and delivered his eulogy. Together with Melancthon, he composed the 'Interim of Leipsic.' He wrote also a 'History of Pomerania.'

Bugg, Lelia Hardin, American author: b. Ironton, Miss. She graduated from the Ursuline Academy, Arcadia, Mo., and continued her studies at Trinity College, Washington. She has written: 'The Correct Thing for Catholics' (1893); 'A Lady' (1894); 'Correct English' (1895); 'Orchids: a Novel' (1896); 'The Prodigal's Daughter' (1898); 'The People of Our Parish' (1899).

Bugge, bûg-gê, Elsens Sophus, Norwegian philologist: b. Laurvig, 1833; d. Christiania, 8 July 1907. After obtaining an education at the Universities of Christiania, Copenhagen, and Berlin he was made professor of comparative philology and Old Norse, at Christiania. He was an eminent authority on northern languages and among his works are an edition of the songs of the Edda, 'Norroen Fornkvæði' (1867); 'Gamle norske Folkeviser' (1868); 'Norroene Skrifter af sagnhistorik Indhold' (1864-73); and a notable edition of the Volsunga and Hervarar sagas.

Bugge, Thomas, Danish astronomer: b. Copenhagen, 12 Oct. 1740; d. 15 June 1815. After Tycho Brahe, he was the greatest astronomer of Denmark. First officiating as professor, he afterward spent most of his time in traveling abroad, and was sent to Paris in 1798 to confer with the commission of the French institute on the subject of the introduction of uniform weights and measures, on which occasion he was made a member of that learned body.

Buggy, a name given to several species of carriages or gigs: In the United States, a light one-horse four-wheeled vehicle with or without a hood or top; in India, a gig with a large hood to screen those who travel in it from the sun's rays; in England, a light one-horse two-wheeled vehicle without a hood.

Bugiardini, Giuliano, joo-lê-ā'nō boo-jār-dē'nē, Italian painter (also known under the Latinized form of his name, as JULIANUS FLORENTINUS): b. Florence, 29 Jan. 1475; d. 16 Feb. 1554. He studied under Ghirlandajo and Albertinelli, and collaborated with Michael Angelo.

Among his best works are: 'The Martyrdom of St. Catherine'; 'Betrothal of St. Catherine'; 'John the Baptist'; 'Virgin with Saints'; 'Virgin with John the Baptist.'

Bugis, boo'jēz, a people of the Indian archipelago, chiefly inhabiting Macassar and Boni, in the island of Celebes. They are muscular, middle-sized, and of a light-brown color, some being even fair. Their dress consists of a piece of red or blue striped cotton, which they wrap about their loins, and pass between their legs. They bind their jet-black hair very tastefully, in a red or blue cotton handkerchief. They pluck out the hair of their beards, and ornament their arms and legs with brass wire above the wrists and ankles, and to these the children attach bells. They are, to a notable degree, proud, passionate, revengeful, and crafty; yet they are regarded as the most civilized of the natives of Celebes, and are the chief trading people in the Malay archipelago. Their fondness for commerce has led to their settling in many places out of Celebes, and a "Bugis quarter" is to be found in most of the large towns of the different islands. They build ships of 50 or 60 tons burden, and their voyages extend from Sumatra to New Guinea. From Macassar the voyage begins with the east monsoon, the prahus trading as they proceed west until they reach Rhio, and even Malacca and Acheen, when they are prepared to return with the change of the season. They take with them native cotton cloths, gold-dust, nutmegs, silver dollars, birds'-nests, camphor, benzoin or frankincense, and tortoise shell; and return with European broadcloths and cottons, opium, unwrought iron, and tobacco, which they partly sell at the intermediate ports as they sail homeward. This is their most important voyage, but they make many subordinate ones for collecting birds'-nests, feathers, tortoise shell, trepang, and other articles of commerce.

Bu'gle, a genus of hardy herbs (*Ajuga*), of the natural order *Labiata*, mostly natives of the cooler parts of Europe and Asia, but cultivated for ornament in many temperate countries. The species, which attain heights ranging from 5 to more than 10 feet, have many whorls, usually of blue, purple, pink, or white flowers, and are useful for planting in the rear of borders. They are readily propagated by seeds or division. Some of the species have escaped, and may be found growing wild on moist land and in the borders of woods.

Bugle, a treble instrument of brass or copper, differing from the trumpet in having a shorter and more conical tube, with a less expanded bell. It is played with a cupped mouthpiece. In the original form it is the signal horn for the infantry, as the trumpet is for the cavalry.

Bugle, a shining, elongated glass bead, usually black, used in decorating women's apparel and also in trafficking with savage tribes.

Bu'gloss, a popular name for various species of the genera *Anchusa*, *Lycopsis*, and *Echium*, of the natural order *Boraginacea*.

BUGONG MOTH — BUHLER

Several species of *Anchusa*, which is also known as alkanet, are cultivated for ornament. They are hardy, have blue or purple blossoms in panicle racemes, which are used as cut flowers. The plants are easily raised from seed and thrive well in sunny places. The species of *Lycopsis*, to which some botanists restrict the name bugloss, are not cultivated in America, but in some parts of Europe certain ones, especially *L. arvensis*, are considered weeds. Several species of *Echium*, popularly known as viper's bugloss, are cultivated under glass in Europe and America, especially in California, where three species are grown out of doors. They are coarse herbs or shrubs which bear beautiful spikes of very numerous white, blue, red or violet flowers with prominent stamens. They are particularly useful where the soil is too poor for many other garden plants, because they produce more numerous and more highly colored blossoms upon such soils than upon rich soil. Indeed, upon rich soil they may fail to blossom altogether.

Bu'gong Moth, a species of owl-moth *Agrotis spina* of the family *Noctuidæ*. It occurs in millions in certain localities in Victoria, Australia. It hibernates as a moth, and in this stage was formerly an important article of food with the native tribes.

Bugo'nia Myth, also Bugonia lore, "Bugonia craze," and "Bugonia superstition." For more than 2,000 years a superstition has prevailed among the masses that besides the usual production of honey-bees in hives, they originated by spontaneous generations from the carcasses of dead animals, and chiefly from those of oxen. Thus, says Osten Sacken, arose in Greece the term Bugonia (from *Bovus* ox; and *γούη* progeny) as well as the Latin names *Bugones melissæ* or *Taurigenæ* apes, "oxen-born bees." Greeks, Carthaginians and Romans spoke of the Bugonia as an every-day occurrence. The poet Archelaus calls them the "factitious progeny of a decaying ox." This superstition has also prevailed in northern Africa and some parts of Asia; it continued to exist through the Middle Ages, and survived till the 16th and 17th centuries, being mentioned by Redi, Aldrovaldi (1602), while Melanchthon regarded it as a divine provision. The original cause of this delusion, which has been finally exploded by Osten-Sacken, lies in the fact that a fly which mimics the honey-bee in shape and its hairy clothing (*Eristalis tenax*, of the order *Diptera*), and which breeds in the carcasses of animals, has always been mistaken for the honey-bee. It is a true fly, with only one pair of wings and no sting, and is a little stouter and larger than a honey-bee. Its larva is the "rat-tailed maggot," that lives in open cess-pools, sewers, etc., and decaying carcasses on which the corrupt liquid forms during the secondary stage of putrescence. The Bugonia myth is, as shown by Osten-Sacken, the foundation of Samson's riddle; the supposed honey-bee issuing from the lion's carcass was evidently the *Eristalis* fly. This insect is now distributed over a greater part of the world, and is abundant in the United States. It was first detected at Cam-

bridge, Mass., in 1875 by Osten-Sacken himself. Consult Osten-Sacken on the Oxen-born Bees of the Ancient (Bugonia) and their relation to *Eristalis tenax*.

Bu'hach, a preparation for destroying insects made by grinding the flower-heads of certain species of chrysanthemums. See INSECT POWDER.

Buhl- (bool) work, a description of inlaid work, consisting at first of inserting a brass scroll or pattern in a ground of dark-colored tortoise-shell or wood; but at a later period the use of wood of a different color, instead of metal, was introduced by Reisner, and to his process the modern practice of buhl-work is chiefly confined. It consists in cutting out a pattern from two veneers of different colored woods, which are glued together with a piece of paper laid between them; the pieces are then separated by running a thin knife through the paper, the patterns are carefully taken out, and the figure removed from the one veneer is inserted into the cavity of the other, the dust of the wood being rubbed in to fill the interstices. A little glue is then rubbed in, and the work laid aside to dry, after which it is ready to be glued to the box or piece of furniture which it is wished to ornament. The cutting of the pattern is effected by the use of a very fine saw, of the kind known as a key-saw, which can readily be made to run around the sinuities of the patterns. The suitable designs for this work are continuous figures like a running vine, or the honeysuckle, the saw completing these without the necessity of discontinuing the work to commence anew. Two pieces of buhl-work are thus produced; but three are frequently obtained by gluing together three pieces of wood, and cutting out in the same manner. It is not, however, found expedient to combine a greater number of pieces. The French term for buhl-work and all sorts of inlaid work, is *marqueterie*. The name buhl is derived from a French cabinet-maker, André Charles Boulle or Boule, formerly miscalled Buhl, b. 1642, d. 1732. He raised cabinet-making to an art industry, and Reisner, above mentioned, was a German contemporary of Boulle's.

Bühler, Johann Georg, yō'hān gä'örg bū'lër, German Orientalist: b. Berstel, Hanover, 19 July 1837; d. April 1896. He pursued his studies in Göttingen, Paris, and London, and in 1863 accepted the chair of Oriental languages in Elphinstone College, Bombay. Among his other labors while in India, he undertook tours into various provinces in search of ancient manuscripts, portions of his collections going to enrich the libraries of European universities. Returning from India in 1880, he became professor of Sanskrit and Indology in the University of Vienna. The breadth and accuracy of his knowledge in various departments of Oriental learning made him an ultimate authority. He collaborated in 1868 in the establishment of the Bombay Sanskrit Series, in 1867-84 in the production of a 'Digest of Hindu Law'; and in 1887 in the founding of the 'Wiener Zeitschrift für die Kunde des Morgenlandes.' His work upon the 'Grundriss der Indo-Arischen Philologie und Alterthumskunde' was interrupted by his death from drowning in Lake Constance.

BUHR STONE—BUILDING

Buhrstone (ber), or Burrstone, a variety of quartz containing many small, empty cells, which give it a peculiar roughness of surface. They are used principally as mill-stones. The best kinds are creamy white, with a granular and somewhat cellular texture, and are obtained in the Tertiary formation of the Paris basin, and chiefly at La-Ferté-sous-Jouarre. They are cut into wedge-shaped parallelipeds, called panes, which are bound together with iron hoops to form large mill-stones. Numerous substitutes for the French buhr stone have been found in the United States, the most important being furnished by the buhrstone rock of the bituminous coal measures of northwestern Pennsylvania and eastern Ohio; but they cannot compete in the great markets with the French rock.

Building. The remarkable physical development of the United States in the last 20 years, with its attendant increase of wealth, is most strongly evidenced in the number of buildings of every character constructed during that period throughout the country. As an incentive to artistic improvement, and an example of co-operated effort and grouping of buildings, the World's Fair at Chicago, re-echoed in varying forms at the expositions of Atlanta, Nashville, Buffalo, and St. Louis, though temporary in character, has exerted a strong influence. Many new schemes of magnitude have been projected along lines which will require years for their completion, but the start has been made intelligently and with a view to the final result. It is only necessary to cite the proposed buildings of the University of California, at San Francisco, and of Washington University, at St. Louis, to suggest the power of this influence. The business and residential sections of the larger cities—and it might almost be added the outlying suburban districts—have undergone in many instances a complete transformation. The improvement and expansion of the steel, cement, brick, and terra-cotta industries (qq.v.) have done more to facilitate this transformation within the cities proper than any other causes. Fortunately the allied mechanical and decorative arts have kept pace with them, and in spite of the popular feeling that our cities are for the most part unsightly, they are more cosmopolitan, convenient, and interesting as to their buildings than ever before.

For the large majority of new buildings the systems of construction hitherto in vogue have been used without great change, and probably will continue to be so used. We must therefore look for signs of structural development, rather than the constructions commonly designated slow-burning, steel-skeleton, and fireproof.

In point of materials, and possibilities of decorative effect, the architect's palette has been extended to an incredible degree. Facilities of transportation make it possible to use granites, marbles, all kinds of stone, brick, and woods, ornamental bronze and iron, the most approved systems of plumbing, heating, lighting, and elevators, without approaching the domain of extravagance, and even without overstepping the limits of true economy. There has been a steady tendency toward more stable, permanent, and beautiful construction,—the outgrowth of public sentiment, which in its turn has been

stimulated by the results attained. It would have been quite impossible 20 years ago, even had individual fortunes at that time been large enough to create the demand, to build the palatial residences, churches, hotels, and office buildings which we now look upon as commonplace, for in many trades skilled artisans were not to be had, and the difficulties of securing proper materials were too great.

Steel structural building of the commercial type has advanced to such an extent, and involves such colossal operations, that vast corporations have been formed for this especial purpose. These corporations are affiliated with financial institutions seeking investments, with owners of real estate desiring to make improvements, and with large manufacturing concerns furnishing materials of construction, so that the necessary conditions for undertakings of importance are kept constantly related. The Fuller Construction Company, The Norcross Brothers Company, The Wells Brothers Company, and others of a similar nature, carry on a business chiefly made up of steel structural buildings, aggregating many millions of dollars per annum, and widely scattered throughout the United States. These companies employ armies of men, covering every building trade and involving details of office management, methods of erection and finishing, transportation and storage of materials, and the harmonizing of the various and often conflicting elements entering into such undertakings, which are almost incredible, and can be appreciated only after the most minute investigation. It may be said in general that these constitute the great movements in building which distinguish the opening years of the 20th century.

Slow-burning Construction.—In buildings requiring special provisions against the spread of fire, and where the artistic effect is not of prime importance, a frequent mode of construction is that known as "slow-burning" or "mill" construction. This has been brought about in a great measure through the efforts of the mutual fire-insurance companies in New England. The system consists usually in building outside walls (generally of brick) of concentrated piers or buttresses, connected by a thin curtain wall; the girders, beams, and interior columns are made of large timbers, and the floors of plank of a suitable thickness. It is essential to avoid concealed hollow spaces, such as furring, where dirt would accumulate. The underlying theory of slow-burning construction is that whereas small timbers, such as the three-inch joists and studs, and the one-inch flooring of ordinary construction, readily burn through and are destroyed, large timbers, under the influence of severe heat, char but do not burn through readily, as the charred surface forms a non-conductor and protects the interior. If, however, for any reason they should burn to destruction, all connections are so made that the timbers can fall out of their places without disintegrating the masonry or columns on which they rest.

Beams are spaced every 8 or 10 feet between centres, and should not be painted for several years after completion of the building, in order to avoid dry-rot. The ends of timbers in masonry bear on iron plates with anchors, or rest in cast-iron boxes, with air spaces in the sides, which permit a circulation of air, and

BUILDING

reduce the risk of dry-rot. Floor planks are not less than three inches in thickness, and for spans of 12 feet usually four inches. The larger spans are less desirable than the smaller. These planks should not be over nine inches wide. They should be planed on both sides, and grooved on the edges, the grooves being filled with hard-wood splines.

Top floors are made of 1¼-inch boards of southern pine, maple, or other hard wood. It is desirable to lay top floors over a three-quarter-inch bed of mortar, or two thicknesses of heavy sheathing paper.

For rooms where there is unusual risk of fire, such as hot-air drying, it is well to protect the ceilings with plastering on metal lath, filling in solid so as to avoid any cavities. Wooden posts should be covered with asbestos paper and tin.

Roofs are best when flat, and are constructed in the same way as the floors. They should be covered with tin, gravel, or duck. Where the roof is pitched, it should be covered with shingles or slate, laid over a three-quarter-inch bed of mortar.

Superposed columns are connected by iron caps, bases, and pintles, arranged to give a proper bearing for the girders.

Partitions, if used, should be two-inch tongued-and-grooved plank set on end, and plastered both sides, on metal lath.

Doors and shutters are built of two or more thicknesses of inch boards, covered on all sides with asbestos paper and tin, lock jointed.

The underwriters' associations have formulated in detail the best practice in mill construction, and are willing to advise on all questionable points.

Steel-skeleton Construction.—The closing years of the 19th century witnessed a development in the structural use of steel for buildings which is wholly without precedent. While columns and floor beams of iron or steel had been in use for many years as interior supporting members, it was not until conditions demanded buildings of extraordinary heights that the metal framework was extended to the exterior as well as the interior structure. Exterior walls constructed entirely of masonry must be made too thick for economy of space and materials if the building which they enclose is more than six or seven stories high.

The first step was made by introducing iron columns in the masonry of the outside walls, with the sole purpose of supporting the adjacent floors, the masonry of the walls carrying itself on its own independent foundations. This system was found also to lack economy after the possible height of buildings had been increased a few stories. The culmination of the system was reached when the exterior frame was designed to carry not only the floors and their various loads, but also the exterior walls. Each story now has its enclosing wall independent of the story above and below it, so that, as is frequently the case, the outer facing or curtain wall of the high building is started at several levels at the same time at intervals of two or three stories.

There would seem to be no limit constructively to which this kind of building can be carried, provided the area of the building at the base is sufficiently large.

Vibration and deflection under the pressure of the wind must be provided against by

stiffening braces or ties in the floors or partitions, more particularly where the height of the structure is relatively great.

Where streets are narrow, the crowding together of a number of such buildings darkens the streets and often produces disagreeable and even dangerous currents of air. The trend of legislation in large cities is toward restriction of height, Boston having already fixed a limit of 125 feet from the sidewalk level to the top of the cornice line.

There are three elements which enter into the construction of the steel-skeleton building,—foundations, columns, and floors. Of these three elements the column is the most important: for while foundations may settle, deranging the floor levels and causing the building to lean out of plumb; and while floors may bend or break without serious danger to any parts of the structure other than themselves,—columns, if they fail, may entail the collapse of the entire structure. For this reason, in the best work, columns are made of the softer, less brittle grades of steel, while floor beams are permitted of "medium" steel, a harder and consequently more brittle grade.

Many sections of columns have been devised, each having its own particular advantages, but columns in which all the surfaces, except those between riveted plates, are accessible, are generally to be preferred. These columns usually consist of a single web or plate, with one or more flange plates connected to the web by riveted angles. Other sections have been devised, made of Z bars or of channels connected by lattice plates, and a very ingenious column is that known as the Gray column, made up of angles in pairs connected by ties. The choice of any one form depends upon the stability of its section, the ease of procuring the parts of which it is composed, and the facility of connections. It is sometimes necessary to use the box column, but it is not to be recommended by reason of the inaccessibility of the interior surfaces. Water and steam pipes are sometimes run inside the fireproofing of columns next to the steel, but this is to be avoided if possible.

Columns are usually made in two- or three-story lengths. The bearing parts are carefully ground normal to their axis, and the connections are made by riveted cover plates. The extraordinary weights which these columns are called upon to carry, demand on ordinary soils a very extended footing. If this were attempted by the old method of brick or stone piers, the foundations would have to be carried to such depths that the system would not be economical. The customary method is that known as the grillage-beam system, in which the column starts from an iron or steel shoe which bears upon steel beams extending on opposite sides of the shoe, and bearing in turn upon one or more layers of beams bolted together and completely imbedded in concrete; under all is a layer of concrete whose area depends upon the compressive resistance of the soil. In rare cases the foundation is of solid rock, and the area may then be reduced to a minimum.

A peculiar type of grillage foundations is required for columns on or near party lines, beyond which the foundations may not extend. A cantilever construction is then used, whereby the wall column foundation is



STEEL SKELETON CONSTRUCTION.

BUILDING

united by beams to the nearest interior column foundation, so that the two act together and in a measure counterbalance each other. Where foundations occupy an interior corner of a property, and must be maintained inside two intersecting party lines, it is often necessary to combine four grillages in the same fashion. Where the soil is of a very compressible nature, as is frequently the case in many parts of Chicago, the entire area of the building may have to be covered by a distributing foundation of concrete and beams, forming a pan upon which the building floats. This has been followed in some cases by settlements due to the leakage of the underlying soil, a result which might easily develop from the construction of other buildings in the immediate neighborhood. Where possible, it is preferable to penetrate through soft soils to a firm bed. In the lower part of Manhattan Island bed-rock has been reached by pneumatic caissons. These caissons are made of steel plates riveted together. The excavation is made under or in the caisson under air pressure sufficient to hold back any water-bearing material which may underlie the foundations of adjoining buildings. After the caisson has been sunk to its proper depth it is filled with concrete or such other masonry as has been designed to form the foundation. Hydraulic caissons have also been used for the same purpose. Where excavations adjoin high buildings on sandy soil, and are carried to a greater depth than the grillages, as in the case of the work on the subway in lower Broadway, New York, an artificial freezing process is sometimes resorted to. A network of tiny pipes is inserted into the sand foundation, winding in and out among each other, so as to reach every part of the foundation soil. A cold salt solution is sent through the pipes, causing the sand foundation to freeze solid. This is a very expensive process and not to be employed unless other means fail. See FOUNDATION.

The floors used in steel-skeleton construction may be of any of the ordinary fireproof types, but in designing the floors it is necessary to connect the columns by steel beams or girders, which act best for the stability of the building if arranged in continuous straight lines. The voids between the girders are spanned by beams, whose spacing is dependent upon the style of floor to be used, varying from 5 to 12 feet, the spaces between being filled by brick arches or porous terra-cotta tiles, or by concrete slabs. The amount of material in the beams must be exactly sufficient for the work—no more or less. This is essential, not only for economy, but also to reduce the dead loads on the joints, columns, and foundations. There are many varieties of each of these systems, nearly all requiring the use of steel ties, plates, or rods. For spans over 12 feet the monolithic concrete floor reinforced by steel bars or metal lath has been used, but there is a great tendency to deflection. The long-span systems are still in their infancy.

The girders of the exterior walls, commonly known as spandrel girders, are used at or near the level of each floor, and should be connected to the columns by knee or angle braces.

While the exterior walls of the building are carried in part on the spandrel girders, it is customary to rivet additional angles or channels on the outer face of the columns for the support of the outer four or more inches of the wall.

All projecting parts of the exterior, such as belt courses, cornices, and balconies, must be supported by special framings. The ornamental finish of cornices having any great projection is often secured to the frame by iron hangers.

All parts of steel framework, except those buried in concrete, such as grillage beams, should be painted with the greatest care, as their preservation depends almost entirely on the quality of paint used and the way in which it is applied. All surfaces should be first thoroughly cleaned of scale and rust. It has been found that concrete adheres to a clean steel surface, and is a sufficient protection. All remaining parts should be given a coat of oil at the shops; they should then be painted with a coat of red lead or graphite paint upon arrival at the building, followed by a second coat after they are assembled. Sometimes a third coat is given, but it is scarcely necessary if the two previous coats have been properly applied.

Fireproofing.—While the steel-skeleton building is economical from the constructive standpoint, its usefulness and safety are greatly impaired if it is left unprotected against the ravages of fire. Many systems of fireproofing have been devised, all of which, however, consist in enclosing the parts with a non-combustible substance,—usually a clay product, or concrete or plaster,—applied in blocks or molded forms, set in mortar. For the outside of exterior columns and girders it is considered sufficient to lay the outer facing of the wall, if of brick or terra-cotta, directly against the metal. Granite, by reason of its friability under the combined action of heat and water, should be kept sufficiently far away from the structural parts to allow of the insertion of a layer of concrete. For all other parts of the skeleton the usual protections consist of two inches of porous terra-cotta block, plaster block, or cinder concrete. Columns and beams are sometimes enveloped with a sheet of wire cloth or expanded metal, and plastered.

None of these systems may be considered absolutely perfect, since they have all shown serious signs of deterioration under the continued action of a fierce fire, but it is a conceded fact that concrete, as a fire-resisting material, is unequalled.

In connection with fireproofing it is essential that interior partitions be built of non-combustible materials. Those most frequently employed are of the same nature as the fireproofing just described. Porous terra-cotta blocks and plaster blocks, three or four inches in thickness, dependent upon the height of the story in which they occur, have certain advantages by reason of the rapidity with which they can be set up, and the ease with which they can be removed where alterations are desired. Partitions are often made of small T or angle irons, over which is spread expanded metal or wire cloth in one or two thicknesses, to which the plastering is directly applied. Double thickness partitions of this sort are more sound-proof than those first mentioned.

In many so-called fireproof buildings wood finishes are desired, which with the contents are a menace; but experience has shown that fire can usually be confined to the room in which it originates, and can be checked in a few minutes. Methods of fireproofing wood have been devised, and consist of injecting a fireproofing solution into the pores, either under pressure or

BUILDING

by capillarity. Its use is not frequent, however, being largely limited to war-ships.

Exterior Finishes.—The artistic effect of a building depends more upon its color than upon its form either in general lines or detail. This is due to the fact that a good color sense is commoner than an appreciation of line and form. So true is this that many excellent designs have been utterly ruined by execution in unpleasing materials, and many meretricious designs receive public commendation entirely due to their satisfactory color effect. The search for novel and beautiful, as well as durable effects, has led to a great multiplication and improvement of materials.

Of all exterior materials the granites easily hold first place for buildings requiring dignity and durability. The finer granites come from New England, and range from various tones of white, through the deepening grays, into the dark reds, greens, and blacks. Many of the granites present beautiful surfaces when polished, and in general combine well in color scheme with almost any other material. The southern granites, so called, are not truly granites in the geological sense. They lack warmth and brilliancy of color, and by reason of their softness stain easily in a harsh climate or smoky atmosphere.

Sandstones, such as those from Ohio, Maryland, Pennsylvania, and Massachusetts, are reliable materials, the particles being well cemented together. They vary in color from the whites to the browns, and have practically superseded the Connecticut brown-stone used extensively in the 'sixties and 'seventies, but whose loose stratification resulted in early deterioration upon exposure.

Of the limestones, that from Indiana has had great popularity by reason of its softness for cutting when fresh, the large sizes in which it is obtainable, and, in the buff varieties, its beautiful color. The stone hardens upon exposure to the air, but its color changes, improving for a year or two, to become almost black after a period of 7 to 10 years.

The white marbles of Vermont, New Hampshire, and Georgia are thoroughly reliable, but discolor without assuming the soft warm tones of the old marble structures of Greece and Italy.

Gneisses abound throughout the Eastern States, some of them approaching very closely in texture to the true granites.

For durability and permanency of color, combined with economy, no exterior facing can surpass natural red brick. The appreciation of red brick has fortunately developed beyond the point where the smooth Philadelphia pressed variety is considered the only brick desirable for the finest work, so that we now have reds toning into the browns and purples, and combined often with dark headers, from which it is possible to lay up a simple surface full of artistic interest. Outside the plain red, there is a wide variety of brick within certain limits; whites, buffs, browns, or grays are easily obtainable both in the plain colors and mottled, and made by either the wet or the dry process. Color, width, and style of mortar joints, if used knowingly, can be made to intensify or soften the natural color of the brick. American enameled brick holds its own with the English, and is invaluable for light-shafts and damp places.

Nearly all makes, however, craze or chip in time.

Architectural terra-cotta, as an exterior finish, easily claims first rank in point of development. Many steel structures are covered entirely with it, excepting perhaps parts near the ground, subject to abrasion. It can be made in almost any color by means of "slips" or "glazes," and it lends itself readily to decoration. The use of terra-cotta is of advantage to the architect, in that he can see the models for every part of the work as they are in process, and vary them to his satisfaction before they are finally cast. Economy in the use of terra-cotta comes chiefly from minimizing the number of molds; but this must be guarded against, for, if pushed to excess, monotony is likely to result.

Ornamental bronze, copper, and iron work, through improved processes of manipulation, have added greatly to the possible richness of exterior effect.

Outside enclosures of sheet metal, such as iron or aluminum, are rarely æsthetic. Corrugated sheet iron has been used extensively for freight sheds, wharf enclosures, and similar ordinary constructions, where no effort for good looks has been made. The enclosure of steel-skeleton buildings with metal is not to be counted upon where such buildings are tenanted, as it is too great a conductor of heat.

Rough-cast and plaster work are most admirable and sympathetic as exterior wall finishes, where the extremes of temperature from winter to summer are not too great. Even adobe structures are possible in the South and West, but their use is most limited. Rough-cast or pebble-dash is applied to both masonry walls and lath; it is more durable on masonry, as the expansion and shrinkage of lath tend to disintegrate the mortar. Rough-cast is combined frequently with timber work in imitation of the old English half-timber constructions, and is specially adapted to domestic buildings of the freer country sort.

Concrete walls, where of the right texture and color, such as that made from coquina in Florida, give a pleasing effect.

Roof coverings comprise tin, copper, slag, tiles, slate, and shingles, each having its own appropriateness. Copper is the only permanent one of those mentioned, and slag is the next best. Tiles and slate require constant repairs, and shingles rarely last more than 20 years. Shingles lend themselves admirably to staining, and are deservedly popular. Thatch is attempted where picturesqueness is demanded.

A roof interesting from the constructive standpoint is that commonly used on the steel-skeleton building. It is known as actinolite, and consists of a number of thicknesses of heavy felts bedded upon a smooth Portland-cement surface, and covered with a roofing cement on which are laid vitrified tiles with the joints thoroughly filled, practically forming a pavement.

Interior Finishes.—For ordinary buildings the interior finish of floors, walls, and ceilings must necessarily be simple, consisting of cement or wood for the floors, and plaster for the walls and ceilings, except that in the case of mill construction walls are usually made of hard red brick, pointed inside the same as outside, and

BUILDING AND LOAN ASSOCIATIONS

ceilings consist of the dressed undersurface of the floor planking white-washed, painted, or varnished.

Cement floors are the most permanent, particularly where they are subjected to moisture, although the hard pine and maple flooring commonly used is less tiresome to walk on and is sufficiently durable.

The so-called patent plasters have come largely into use by reason of their hardness and quick-setting quality. They are mixed by machine in fixed proportions, and are therefore more dependable in quality than the ordinary lime mortar. If applied to lath, the patent plasters require that the lath, if of wood, shall be wet before application, or, if of metal, that the metal be of heavy threads, as the finer wire cloth is sometimes eaten away by the ingredients of the plaster.

Tiles, whether of marble, ceramic, or glass, form excellent interior finishes, except that small tiles for floors are likely to loosen, and frequent joints in tiling become unsightly through discoloration. The glass tile known as "opalite" produces a finish similar to enameled brick, and has been shown in some cases to be more lasting. Interlocking rubber tiles are desirable in cases where there is risk of slipping, such as for elevator floors. They are also good dealers of sound.

Beautiful effects of mosaic, both of marble and of glass, are easily obtainable—a great variety of color and design is largely in their favor. All of these applied finishes require a solid base, preferably of masonry or concrete.

The variety of woods for interior finish is almost without limit, and has been greatly increased by staining and by methods of finish.

In no department of interior ornamentation has greater progress been made than in plaster work—a system which can be pushed to almost any point of elaboration, and which lends itself perfectly to painted decoration. In fact, there are few materials that cannot be simulated in plaster if the decoration is clever.

The field of interior decoration was never wider, and the knowledge of the application of leathers, stamped, modeled, and woven fabrics, and the thousand and one other forms of wall applications, never better understood.

In marble for interior use America is not particularly fortunate. Granite and limestone produce satisfactory results, but most of the American marbles are cold and lacking in richness of texture. Among the best marbles are the Knoxville Gray, and a few of the whites. For the more beautiful effects recourse must be had to the imported marbles, such as Sienna, Numidian, Pavonazza, Alps Green, and others.

EDGAR V. SEELER,
Architect.

Building and Loan Associations, co-operative organizations, originally designed to aid their members in procuring homes, at the lowest cost, and on the easiest terms. Later developments gave them some of the functions of a bank for savings. The associations are a development, dating from about 1835, when a few experimental ones existed in the United States, the movement beginning in Pennsylvania. The original associations proving successful, plans were gradually improved, until by 1850 they became an established part of American institu-

tions. They have been operated under various titles, besides the above, as mutual loan associations, home assistance associations, co-operative savings and loan associations, and co-operative banks, the latter title being popular in New England.

The basic plan of these associations is the issuing of stock, which is paid for in monthly instalments, and the loaning of the money thus raised to shareholders, borrowers paying twice as much per month as lenders. It has been common to give the shares a maturing value of \$200 each, on which the holders pay \$1 per month as long as they are lenders or investors, and \$2 per month, as soon as they become borrowers on their stock. In addition to the \$2, the borrower is also liable to have to pay a premium to secure his loan, when there are more shareholders seeking loans than there is money to loan.

Under such an arrangement an association received an average of \$1.50 per month per share, and in the course of a little more than 11 years this was theoretically sufficient to bring the shares to par value. In practice, the shares would sometimes run out in 10 years, if premiums on loans ran high, and sometimes 12 or more years were required for shares to reach the \$200 value, if the association had passed through hard times. When the shares reached the \$200, or other maturing value, the lenders received their money back, and the borrowers had their loans canceled. Under the early plans, the maturing of the shares wound up the association. This was a hardship to many, and as a result the issuing of shares in annual series has become common. This enables outsiders to come in and take shares any time a new series is opened, or to purchase the most recent series, by paying the dues for the number of months such series has run.

The legislatures of the various States have made laws rendering easy the forming of these associations, because they have proven to be a good means of enabling wage workers to build and own their own homes. The parties interested manage their own affairs, and as the money is loaned out as fast as it comes in, there is seldom any loss by speculation. To illustrate how these associations assist a man of small means to build and pay for a home, let us follow the system from his point of view. Suppose he has a lot of land, for which he has paid \$400. He can subscribe for five shares of an association, of the par value of \$200 each, paying therefor \$5 per month. Every month, or every few months, there will be money to be loaned, and he attends the meetings, and when he thinks the premiums are low, he bids in a \$1,000 loan. If he has bid 10 cents premium on this, he must pay \$2.10 each month on his shares, from the time he receives the use of the money. As a matter of fact he does not handle the money, but having bid successfully, and the directors having passed upon his lot and proposed house as a safe loan, he sets a builder to work, and his house is put up, the association taking a mortgage on it for \$1,000, and the builder collecting his \$1,000 from the association. Every month he pays his \$10.50 into the association, just as if he were paying rent, and in 10 or 11 years the shares mature, and the home is paid for.

The plan appeals to the wage worker, because of the easy payments. It appeals to small lenders, because it affords them a sort of savings-

BUILDING LEASE—BUILDING MATERIALS

bank, and encourages systematic savings. Small tradesmen and merchants are almost as apt to become interested in such associations as are those who work for a weekly wage, and the economical methods by which a large amount of money is borrowed and loaned safely have attracted many to the associations as being a safe depository, and sure to pay 6 per cent dividends.

Originally, these associations were usually confined to a town or locality, no loans being made beyond the territory where most of the members lived and knew the value of the property. But within recent years both State and national associations have been organized, which do business anywhere within the limits of their larger territory.

The management of an association is usually lodged in a board of directors elected annually from the shareholders, and whose members serve without pay. They pass upon the loans, and having investments of their own to protect, closely guard the association treasury. The secretary is customarily the only salaried officer, and is often paid for doing the detail work by a system of small fees. Sometimes the fines levied on delinquents are his sole compensation.

Each association makes minor laws of its own, and many vary the plan as above given in numerous details; but the general principles here outlined are the same with all. In 1910 there were 5,713 of these associations, having a membership of 2,016,651, and total assets of \$856,332,719.

Building Lease. A lease of land for a long term of years, usually 99 years, at a rent called a ground-rent, the lessee covenanting to erect certain edifices thereon, and to maintain the same during the term. At the expiration of the lease the houses built become the absolute property of the landlord, unless otherwise provided in the contract. See LEASE.

Building Materials. The materials used for structural engineering and architectural purposes may be conveniently divided into two general classes—"Materials of Construction," such as the woods, stone, metals, cements, etc., and "Materials of Consumption," such as coal, water, oil, etc., which are consumed or transformed while being used.

In this article, the materials of construction will be briefly considered according to their physical and chemical properties, and their adaptability for various purposes, leaving the consideration of the materials of consumption to the sphere of chemistry and physics where they properly belong.

Apart from their chemical composition, the principal properties of building materials important to the engineer are the "density" or specific gravity of the substance; its "resistance" or capacity to withstand strains and stresses; the "hardness" or power to oppose penetration; its "toughness" or capacity to elongate under tension without rupturing; its "brittleness," which is the opposite of toughness; and, its behavior under conditions of varying temperature, or when worked in the many ways required by structural operations.

Timber or Wood.—The following general facts relative to the physical properties of wood have been determined by experiments: (1) Bleeding has not much effect on the strength

of wood, but increases its flexibility slightly, and it is probable that bleached timber will stand exposure to the weather fully as well as the unbleached. (2) In general, moisture absorbed in the form of sap, or in the form of water after seasoning, reduces the strength of wood. Well-seasoned wood or that which contains not more than 12 per cent. of moisture is from 75 to 100 per cent. stronger than green timber. (3) In artificially-dried timber any remaining moisture exists in a uniform percentage throughout the mass, a condition which requires months, and sometimes years to attain in heavy air-dried timber. (4) The strength per square inch of section of large timbers is in every way equal to that of small timbers, provided they are equally sound and contain the same percentage of moisture. (5) In general, the strength of woods of uniform structure increases with their specific gravity, that is, the heaviest wood is generally the strongest. Oak, however, appears to be an exception to this rule. (6) Seasoned wood will increase in weight to the extent of 5 to 15 per cent. if exposed to the weather. This excess of weight can be easily reduced by keeping the timber in a warm dry place for a week or ten days.

The opposite table gives the physical properties of some of the woods suitable for structural, interior finishing, decorative and other similar purposes. The "elastic limit" given in the table is a relative quantity, as there is no definite "elastic limit" in woods similar to that in metals.

In selecting and preparing timber or wood for structural purposes, a careful consideration of the following facts in addition to those already stated is quite important: (1) That timber grown in moist soils is lighter, and decays more quickly than that grown in dry, sandy soil, and that, usually, the best timber is that grown in a dark soil intermixed with gravel, with the exception of the various kinds, such as poplar, cypress, willow and all others that naturally grow best in a wet soil. (2) That the wood of trees grown upon the plains, or in the centre of forests is less dense than that of those grown upon the edge of a forest or upon the side of a hill. (3) In temperate latitudes, as in the United States, standing timber should be selected in the latter part of July or the first part of August, when the sound and healthy trees are indicated by fresh green leaves, in contrast to the unsound and unhealthy trees, the leaves of which begin to turn yellow at that season of the year. Decaying branches, a scarcity of leaves, and the tendency of the bark to become rough and to separate from the wood, are positive indications that the physical properties of the wood are impaired.

The trees selected should be those that have most nearly attained their full maturity, a period which varies greatly with the different species. As a rule, the age and the rate of growth of a tree may be ascertained from the number and the width of the rings of annual increase which are exhibited in a cross-section of the wood. (4) Timber should be felled or cut either in midsummer or in mid-

BUILDING MATERIALS

winter. In midsummer, the most suitable time is in the month of July. A tree should be cut as near to the ground as possible, as the lower part of the trunk furnishes the best timber. (5) As soon as a tree is felled it should be "dressed" by having its bark stripped off, then raised from the ground and the sap-wood removed, and finally squared or reduced to the required dimensions. (6) In the inspection of timber the quality of the wood may be ascertained by observing that its color, as exhibited by a cross-section, is practically uniform in the heart. It may be a little deeper in color at the centre than near the white-colored sap-wood next to the bark, but the gradation should be uniform and free from sudden transitions of color, or white spots, which are infallible signs of decay; that it is free from "wind-shakes" or circular cracks which separate the concentric layers of wood from each other, and which constitute a very serious defect; that it is free from "splits," "checks," and "cracks," which extend very deeply toward the centre; and that it is free from large or decayed knots, which tend to materially affect its strength.

acter. Other serious defects are indicated by the presence of many knots, which, although the timber may be sound, stamps it as being of stunted growth, and is commonly known as "knotty timber," and a spirally winding grain characteristic of "twisted wood" which is unfit for long pieces. Dry-rot is indicated by yellow stains; elm and beech are very quickly affected by it if left with the bark on after felling.

The proper seasoning and preserving of timber is of the utmost importance in connection with its use as a material of construction. Freshly cut timber contains from 35 to 50 per cent. of moisture, which may be reduced to 17 or 25 per cent., by exposure to the air in seasoning one year, and to below 12 per cent., by artificial drying in a comparatively short time.

There are various processes of seasoning. Natural seasoning requires a period ranging from 2 to 8 years, according to the size and physical properties of the wood. Timber of large dimensions is not only improved in strength, but is rendered less liable to warp and crack when becoming seasoned, by being previously immersed in water for several

PHYSICAL PROPERTIES OF TIMBER OR WOOD.

(As determined by tests of seasoned timber, containing 12 per cent. or less of moisture.)

The stresses are given in pounds per square inch

NAME OF WOOD.	ULTIMATE RESISTANCE TO—					Elastic limit	MODULUS OF—			ORDINARY WORKING STRESS			Weight per cubic foot (pounds)
	Tension	Compression (length)	Compression (cross)	Shearing (length)	Shearing (cross)		Elasticity	Ultimate bending	Elastic bending	Tension	Compression	Transverse	
Ash (American).	17,000	7,200	1,920	1,100	6,820	7,900	1,640,000	10,800	7,900	2,000	1,000	1,200	39
Birch	15,000	8,000	.....	.....	5,600	.....	1,645,000	11,700	.....	2,000	1,000	1,200	33
Cedar (American red).	10,600	6,000	600	400	1,300	5,600	900,000	7,000	5,600	1,300	700	900	24
Chestnut	14,100	5,300	.....	.....	1,500	.....	1,130,000	8,000	.....	1,400	600	900	41
Fir	23,000	.....	.....	1,300	.....	.....	1,500,000	.....	.....	.....	.....	.....	.....
Gum	.....	7,000	1,400	800	5,800	7,800	1,700,000	9,600	7,600	1,200	900	900	37
Hemlock	8,700	5,700	.....	400	2,700	.....	.....	7,000	.....	.....	.....	750	25
Hickory (American aver.).	19,500	9,500	2,500	1,000	6,200	11,200	2,400,000	17,000	12,000	2,000	1,200	1,800	50
Lignum-vitæ	11,800	9,800	.....	.....	.....	.....	.....	11,000	.....	1,500	1,100	1,500	83
Maple	11,000	7,000	1,800	500	6,000	.....	.....	10,000	.....	.....	.....	.....	49
Oregon pine	23,000	5,700	800	500	.....	6,400	1,600,000	7,800	6,400	1,400	700	1,000	32
Oak (black)	20,000	7,300	1,900	1,100	.....	8,100	1,740,000	10,800	8,100	1,400	900	1,800	45
Oak (white)	23,600	8,500	2,200	1,000	4,400	9,600	2,050,000	13,000	9,600	1,700	1,000	1,500	50
Pine (Southern yellow)	23,000	8,000	1,200	835	5,600	10,000	2,070,000	12,600	9,500	1,600	1,000	1,500	38
Pine (Cuban)	23,000	8,700	1,200	770	5,000	11,000	2,300,000	13,600	10,600	.....	.....	.....	.....
Pine (loblolly)	23,000	7,400	1,250	800	.....	9,200	2,050,000	11,300	9,400	1,100	900	1,200	33
Pine (white)	10,000	5,400	700	420	2,500	6,400	1,590,000	7,900	6,400	1,200	700	900	24
Poplar	7,000	5,000	.....	.....	.....	.....	.....	6,500	.....	900	600	750	.....
Spruce (Northern)	11,000	6,000	800	400	3,250	.....	1,400,000	8,000	.....	1,800	700	900	26
Spruce (Southern)	.....	7,300	1,200	800	.....	8,400	1,640,000	10,000	8,400	1,200	700	900	30
Walnut (black)	10,500	7,500	2,500	.....	4,700	5,700	1,300,000	8,000	.....	1,000	1,000	900	38

Furthermore, the condition known as "brash-wood," is generally consequent to the decay of the tree on account of age, and is characterized by a reddish color of the wood which becomes porous, and breaks off short without splintering; while "belted" timber is that which has been killed, or which has died from some unavoidable cause, before being felled, and is of a highly objectionable char-

acters. When the seasoning is accomplished naturally by exposure to the air, the timber should be piled under a shed and kept dry, with a free circulation of air about it, but without being exposed to strong currents of the same. The bottom pieces should be placed upon skids raised about two feet from the ground, and a space of at least an inch should be allowed between the horizontal layers.

BUILDING MATERIALS

Slats or piling strips should be placed between the layers at each end of the pile, and also at short intervals between the ends so as to prevent the timber from "winding." It is important that these strips should be placed directly one over the other and that they should not be less than one inch in thickness. Care should be taken to pile the heavy timbers upon the ground floor of the shelter, and the light stuff upon the upper portion, with a clearance of at least two and one-half feet between the piles. The timber should be re-piled from time to time, and all pieces showing any indications of decay should be removed, so as to prevent their affecting that which remains sound and healthy. The gradual method of seasoning is undoubtedly the most suitable for preserving the strength and durability of the timber; but, as already stated in the preceding paragraphs, it has been very definitely ascertained by tests that the results of artificial methods properly applied do not indicate that those qualities are materially affected by such processes, while other important advantages, such as the reduction in the time required for seasoning, and the uniformity of the percentage of moisture contained in the seasoned product, are unquestionably obtained. The hastening of seasoning by steaming the timber has been successfully accomplished, and the saturation of timber with a solution of corrosive sublimate, to secure it against dry-rot, and to protect it from the attacks of worms, has proved very satisfactory. Kiln-drying, however, is applicable only for boards and other pieces of small dimensions, and has a tendency to crack the wood and impair the strength in various ways, unless it is accomplished very slowly. Timber ought not to be seasoned by either charring, or smoking, and should not be painted unless it has been thoroughly seasoned, as such methods and applications effectually prevent the drying of the wood in the interior of the piece, so that fermentation sets in and decay soon takes place.

The principal processes of impregnation are the following: "Kyanizing," introduced by Kyan in 1832, consists of saturating the wood with a solution containing 1 pound of chloride of mercury to 4 gallons of water under a pressure of 15 pounds per square inch; "Burnettizing," introduced by Burnett in 1838, by which the wood is impregnated with a solution of 1 pound of chloride of zinc to 10 gallons of water, under an endwise pressure of 150 pounds to the square inch; the process introduced by Bouchéri, by which the wood is impregnated with a solution of 1 pound of sulphate of copper to 12½ gallons of water, under a pressure of 15 pounds per square inch; "Creosoting," introduced by Bethel, by which the wood is impregnated with the oil of creosote mixed with bituminous matter under an endwise pressure of 150 to 400 pounds per square inch. The Kyanizing and the Bouchéri processes are applied to standing timber, that is, while the tree is still growing, the head is cut off and the top of the stem is hollowed into the form of a bowl and filled with the solution which, being replenished from

time to time, soaks down into the tree, killing it as it goes down, but thoroughly saturating the wood and imparting to it a remarkable degree of durability. Timber may be creosoted by simply steeping it in the oil of creosote, but the "creosoting" and "burnettizing" of timber of large dimensions is accomplished with the aid of special apparatus that gives the requisite pressures. Creosoting is the most satisfactory method of preserving timber used as piles for wharves against the attacks of the "Teredo" or ship-worm, but it is not an infallible remedy.

The presence of vegetable albumen in timber appears to be the primary cause for its deterioration. The most necessary element in the healthy growing tree, it is the most pernicious of all in that which is dead. The sapwood contains a large proportion of it and other fermentable elements, the putrefactions of which cause dry-rot or sap-rot, and produce various forms of injurious fungi, therefore, in order to correct these evils, the most effective method to preserve timber is to expel or exhaust its fluids, solidify its albumen, and introduce an antiseptic liquid. This appears to be accomplished in the most satisfactory manner by the process introduced by Robbins in 1865, by which the liquids are dissipated and the albumen solidified by heating the wood in a chamber raised to a temperature of 212° Fahr., and then submitting it to the vapor of coal-tar, resin or bituminous oils, which being at a temperature of not less than 325° Fahr., readily takes the place of the vapor expelled by the lower temperature.

Stone.—To be suitable for building purposes, it is essential that a stone should possess the qualities of durability, permanency of color, strength and toughness, and should be susceptible of being inexpensively quarried, and easily worked. The greater number of such stones belongs to some one of the following classes of rocks: (1) The crystalline silicious; (2) the calcareous; and (3) the fragmentary rocks, including the sandstones and slates.

Of the crystalline silicious rocks, the best known and the most suitable are the granites and the syenites, which possess an average crushing strength ranging from 12,000 to 16,000 pounds per square inch. Some authorities credit them with an ultimate crushing strength ranging from 25,000 to 30,000 pounds per square inch, but the results of the latest tests are indicative of the smaller values, which are, however, all sufficient for any kind of building purposes. These stones, varying greatly in their physical composition and color are found in large quantities in all parts of the world. They are very proof against the action of frost, and are commonly quite permanent in color, which ranges in the modern varieties, from a sparkling whitish gray to dark gray, and from a delicate pink to a dark red. Until recently, on account of their great hardness, granite was only employed for massive masonry in which roughly dressed stones could be appropriately used, or where the magnitude of the structures permitted the great expense involved by dressing and pol-

BUILDING MATERIALS

ishing; but, the development of improved forms of stone-cutting and dressing machinery during the last few years permits of its being turned and carved into columns, pilasters, and other forms, and polished perfectly, at a comparatively small expense, so that it is being used more and more extensively, and is becoming one of the most popular of all building stones.

Although quarried in practically every eastern State embracing the Appalachian Mountain system, from Maine to North Carolina, and in the States of California, Montana, Wyoming, Colorado, Minnesota, Wisconsin and Missouri, the greatest supply of granite in the United States is furnished by Maine and Massachusetts. The Maine granites, principally derived from the Hurricane Island quarries, are mostly of the light gray variety, although a limited amount of the pink and red varieties are also quarried and are found to be commercially available. The Massachusetts granites are of a rich dark blue-gray color, and are extensively quarried in the vicinity of Quincy, while other fine granites of similar qualities are quarried at Concord, New Hampshire, and Westerly, Rhode Island.

While the United States is one of the largest producers of granite, it is also one of the largest importers of the stone. Red granites from the quarries at Peterhead, Scotland, and the gray granites from Aberdeen are quite largely imported into this country for monumental work. They take a very high polish, and are of great durability, especially the coarse red variety. This is also the case with the red and gray Canadian granites, which are extensively quarried in Quebec, New Brunswick, Nova Scotia, Ontario and near Victoria, in British Columbia. In the United States, besides granite and syenite, the other crystalline silicious rocks available to some extent for building purposes are porphyry, gneiss and trap. Porphyry, although a very handsome building stone, with large crystalline structure, and colors ranging through shades of white, gray, pink, red and black, is used only to a limited extent in rough construction on account of its great hardness, and the consequent difficulty of cutting and polishing it within a reasonable limit of expense. Gneiss is more extensively used; it resembles granite in composition, but unlike granite, it has a well-defined cleavage, which allows it to be split into thick slabs. Trap is a sombre-hued rock, which is very difficult to work, and is seldom used as a material of construction, except in the form of paving blocks, or as crushed stone for making concrete or road material.

Of the calcareous rocks, the most suitable for structural purposes are the limestones and the marbles. These consist of carbonate of lime, and differ in quality rather than in composition, the marble having a crystalline structure capable of taking a high polish. The oolitic limestones, possessing great strength, their resistance to compression ranging from 12,000 to 17,000 pounds per square inch, are of a very fine and even texture. The most widely known in the United States are those

quarried in Indiana and Kentucky, and commonly known as "Bedford Stone;" they are handsome in color and are very easily worked. The colors of limestones range through broken shades of pink, red, yellow, green and blue, imparted to the structure by various impurities. Dolomitic limestone, commonly known as dolomite, contains magnesia in addition to the carbonate of lime; is somewhat coarse in quality, and is quarried in nearly every State of the Union, to supply an apparently permanent local demand. The most favorably known of the foreign varieties is that obtained from the quarries of the Isle of Portland, England, and the French stones quarried near Caen, Normandy. The latter is a soft, fine grained stone of a light color very suitable for carved work, but entirely unfitted for exposed structures in cold climates, on account of its highly absorbent quality.

The marbles are much softer than the limestones, and have a crushing strength ranging from 7,000 to 8,000 pounds per square inch. They are the most showy and ornamental of all building stones, and have been very popular since the earliest times. A great many beautiful varieties are quarried in various parts of the United States, but about 60 per cent. of the total amount is quarried in the State of Vermont, the principal centres of the industry being at Dorset, West Rutland, Middlebury, Wallingford, Brandon and Pittsford. These marbles are of all varieties of texture, and range in color from pure white to dark green, and dark blue, the white stones often being veined and mottled with the darker colors. Very beautiful marbles are also quarried in Tennessee. They are particularly noticeable on account of their variegated colors, which include many shades of chocolate and red, and lemon yellow, olive and green, which form an endless variety of color combinations of striking effect. The distribution of these Appalachian marbles extends from Vermont to Georgia, and are extensively quarried in all of the States bordering that mountain system. On the other hand, although very fine marble deposits exist in many of the States in the Rocky Mountain region, they have not been worked to any great extent, up to the present time.

The most notable of the foreign marbles are those of Italy, the French Pyrenees and Belgium, although Germany, Austria, Spain, Portugal and Ireland, also furnish many varieties of fine texture and color. Among the most beautiful of these European productions are the "Brocatelle" marbles, having a light yellow body marked with veins and blotches of dull red, and the Languedoc, having a brilliant scarlet body color blotched with white, both of which are obtained from the Pyrenees; the "Black and Gold," a black limestone veined with yellow; the pure white stone of Carrara, and the "Giallo Antico," a yellow marble, all three of which are obtained from Italy; and the Saint Anne marble having a deep blue-black body color marked with white veins, and the pure black marble known as "Belgian Black," which are obtained from Belgium.

BUILDING MATERIALS

Of the fragmentary rocks, a great variety of sandstones are used for facing, lintels, and general structural purposes, while slate is used for roofing, and for floor tiles, flagging and mantels. Sandstones are composed of rounded and angular grains of sand, bound together by such cementing materials as silica, oxide of iron and carbonate of lime, into the form of solid rocks. The presence of silica gives a white colored stone of durable quality, but very difficult to work. Cementation by oxide of iron gives a reddish or brownish stone of medium durability, fairly easy to work. Carbonate of lime cement gives a gray-colored stone much softer than the other two varieties, and much easier to work, but much less durable. Sandstones vary in texture from those having a very fine grain to those composed of pebbles. The latter are divided into two classes—the "conglomerates" composed of rounded pebbles, and "breccias" composed of angular pebbles. Some sandstones have a clayey cement which makes them unfit for building purposes, while others, although they do not contain hardly any cement, and owe their tenacity to the pressure under which they were consolidated, make good building stone. As a general rule, sandstones are softer when first quarried, than after a period of seasoning by exposure to the air. They vary in color from light gray, buff, drab and blue, through shades of brown, pink and red. Their resistance to compression ranges from 9,000 pounds per square inch in the Ohio sandstone, to 12,000 pounds in the New Jersey stone; while the "Medina" stone and the blue-stone of New York have a crushing strength of 14,000 pounds per square inch. Other well-known and extensively quarried varieties are the "Berea" stone of Ohio, and the "Portland" stone of Massachusetts and Connecticut.

Slate consists of an indurated clay which may be easily split into sheets of various sizes and considerable thinness. The principal quarries in this country are located in Maine, Vermont, Pennsylvania and New York, while those of Ardenes in France, and of Wales in England, are the greatest producers in Europe.

The methods employed in quarrying building-stone vary with the character of the stone, but the ultimate object of all of them is to obtain large and well-shaped blocks free from incipient fractures. Therefore, explosives are used as little as possible for that purpose, and the work of dressing is very largely done by hand. A great deal of machinery, however, is employed for the purposes of sawing, planing and polishing, and for splitting slate.

The durability of a building stone is one of the most important factors in its value as a material of construction. Durability is the ability of a stone to withstand the deterioration induced by its exposure, to the action of changing weather and temperature conditions, to the chemical agencies in the moisture of the atmosphere, and to the disintegrating action of growing organisms. The normal strengths of the softest building stones are much greater than is necessary for structural purposes, but under the action of the natural

elements and agencies just stated, they disintegrate more or less rapidly according to their structure and the materials of which they are composed. Granites suffer disintegration chiefly from changes of temperature, and are affected but little by the expansion and contraction due to the absorption of water and its subsequent freezing in cold climates; and are almost entirely unaffected by the chemicals ordinarily held in the atmosphere, or carried by rain. Limestones suffer even less by expansion and contraction, but deteriorate much more quickly under the action of the chemicals in the air and rain; while the sandstones, on account of their porous structure, suffer chiefly from the effects of expansion and contraction and disintegrate so rapidly from the effects of frost that they are unsuitable for building purposes in countries with cold climates.

As the durability or "life in years" of a given variety of building stone would, therefore, vary greatly under different climatic conditions, it is obvious that the engineer and architect cannot be too careful in selecting the stones best suited to the climatic and other conditions of the localities in which his structure is to be built. In order to make the selection intelligently, it is necessary for him to know the special qualities of the various stones, according to their structural constituents, and the natural causes by which those constituents were formed into rocks. The porosity, or the capacity to absorb moisture, of the various classes of stone available for building purposes, varies from $\frac{1}{2}$ to 2 per cent. in the granites; 2 to 4 per cent. in the limestones, and 2 to 8 per cent. in the sandstones, and their hardness or resistance depends on the firmness with which the particles of which they consist are bound together. In the igneous or metamorphic rocks, the bond is the result of crystallization, and in the sedimentary rocks it is due to cementation by depositions of silica, etc., between the individual grains as already described. The resistance of a stone to frost action may be conveniently and accurately tested by soaking it in water and then freezing it; the process being repeated a number of times and the amount of disintegration noted.

Artificial Stones.—These are represented by a great variety of artificial compositions of which the basis is hydraulic cement. The best known varieties are the "Béton-Coignet," a French production composed of Portland cement, silicious hydraulic cement and clean sharp sand. These constituents when mixed together with a small amount of cold water make a plastic compound which is hardened in molds to the consistency of a stone, very suitable for various building purposes; the "Ransome stone," which consists of a mixture of sand and silicate of soda, moulded into blocks and slabs, are hardened under pressure in a hot solution of chloride of calcium; "Portland stone," consisting of a mixture of Portland cement and sand, or sand and gravel, rammed while wet and plastic into molds to harden; "McMurtrie stone," consisting of the Portland stone mixture to which a certain

amount of alum and potash soap is added so as to deposit compounds of alumina in the pores of the stone and thus reduce its porosity; the "Sorel stone," another French product, made by adding a solution of chloride of magnesium to the oxide of magnesium; and various kinds of "sand bricks" made by mixing sand and lime into a moist paste, which after molding into blocks of various sizes, are hardened by heat in suitable furnaces. The Portland stone, under various trade names, is very extensively used in the United States; the Ransome stone in England, and the French products mostly in the country in which they were originated. All of them possess considerable merit for building purposes, except the Sorel stone, which is mainly used for making emery wheels.

Cement is applied in various ways for structural purposes other than simply as a bonding material. The several varieties of cements consisting of common lime, hydraulic lime, and those classified as "natural," "Portland" and puzzolanic cements, when combined with sand, and broken stone or gravel, or other hard material in fragments, afford several varieties of concrete which are extensively used for foundations in damp and soft or yielding soils; for breakwaters and for sea walls; for sidewalks, pavements and sustaining walls, and for subterranean and submarine masonry, under almost every combination of circumstances occurring in practice.

Combined with structural iron and steel, and now generally known as "re-inforced concrete," its sphere of application has been greatly extended, especially as a structural material for bridges, and in the construction of fireproof buildings. It has been demonstrated by actual test, that in these lines its general durability and fire-resisting qualities are not only superior to any other material, but that by its use the cost of large structures, such as office buildings, etc., may be reduced at least 20 per cent., as compared with the estimated cost of the steel and tile of ordinary fireproof construction.

The use of various kinds of brick and tile, and of iron, steel and other metals for building purposes, is too familiar to require a detailed account in this connection, especially as they are exhaustively treated under their special titles. It is important to note, however, that during the last decade, the tensile strength of structural iron and steel have been more than doubled by improved processes of manufacture, and they have almost entirely supplanted wood and stone in those portions of large structures which are subjected to the greatest strains, and also where economy of space is of vital importance.

For further detailed information relative to the production and strength of various kinds of building materials, and the specific purposes for which they are most suitable, see articles entitled ARCHITECTURE; BRICK; BUILDING; BUILDING STONE; CEMENT; CONCRETE; RE-INFORCED CONCRETE; IRON; LUMBER INDUSTRY IN THE UNITED STATES; STEEL, MANUFACTURE OF; TIMBER LANDS; WOOD; AND SPECIAL ARTICLES ON GRANITE; LIMESTONE; MARBLE; SANDSTONE;

MASONRY, STRENGTH OF MATERIALS, in this Encyclopædia.

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Buisson, Ferdinand Edouard, fār-dē-nōñ ā-door-ār bwē-sōñ, French educational administrator: b. Paris, 20 Dec. 1841. After completing his studies at Paris he went to Neuchâtel, Switzerland, where he taught from 1866 to 1870. His appointment by Jules Simon in 1871 as inspector of elementary schools aroused much agitation on account of his advocacy of the secularization of the schools. The opposition of the Church party led to his resignation. In 1873 he was sent to the exposition in Vienna, to represent French educational interests; in 1876 he came to Philadelphia on a similar mission, and in 1878 was in charge of the educational section of the Paris Exposition. In 1879 he was made director of elementary instruction and became prominent for the reforms introduced during his administration. After resigning from this post in 1896 he accepted the professorship of pedagogy in the *Faculté des Lettres*. His strong stand on the Dreyfus question attracted much attention. He is the author of an authoritative 'Dictionary of Pedagogy' (1882-4), and has also written 'Liberal Christianity'; 'Orthodoxy and the Gospel in the Reformed Church'; 'The Teaching of Sacred History in Primary Schools'; 'Duties of American Scholars'; 'Pedagogical Lectures and Talks'; and a life of Sébastien Castellion.

Bukowina, boo-kō-vē'nā ("beech land"), Austria-Hungary, a province in the extreme east of the empire, surrounded by Galicia, Russia, Moldavia, and Hungary. Area, 4,035 square miles. It is traversed by offsets of the Carpathians, culminating at 6,077 feet; gives rise to many rivers flowing toward the Black Sea; and abounds in wood, along with considerable mineral riches.

Bul-tso ("borax lake"), Thibet, a lake situated 100 miles northwest of Lassa. It has an area of 24 square miles.

Bulacan, boo-lā-kan', Philippines, a town in Luzon, about 22 miles northwest of Manila, with which it is connected by railway. The town is composed mainly of native huts, although there are factories in which silk matting is made. Sugar-boiling is also an industry of importance. The place has strategic advantages, which caused it to become a theatre of military operations after the Spanish-American war. It was fully pacified in 1900, and made a military post by the United States authorities. Pop. about 14,000.

Bulama, boo-lā'ma, an island on the west coast of Africa, one of the Bissagos. It is 18 miles long and 9 broad, and is situated about two miles from the mouth of the Rio Grande. It is very fertile, but not easy of access. It is now occupied by the Portuguese. See BISSAGOS.

BULAN — BULGARIA

Bulan, boo-lān, Philippines, a town of the province of Albay, situated in the southeastern part of the island of Luzon. Pop. about 11,000.

Bulan, boo'low, or **Tikus**, ti'koos, an animal of the mole family (*Talpidae*) and genus *Gymnura* (*G. rafflesii*), a native of Sumatra and Malacca, bearing a considerable resemblance to the opossum. The muzzle is much prolonged, the fur pierced by a number of long hairs or bristles, and the tail naked. It is possessed of glands which secrete a kind of musk.

Bulawayo, boo-lā-wā'yō, Rhodesia, the principal town and chief commercial centre of Matabeleland, South Africa, 490 miles north-east of Mafeking, 1,360 miles from Cape Town, with which it is connected by railroad. It has several hotels, good business blocks and residences, banks, and telephone service, and is rapidly growing in size and importance. A few years ago it was the chief town of the Matabele tribe, though only a collection of rude huts, in an enclosure of wattles, whose inhabitants were savages of the lowest type. The royal kraal is now replaced by the government house, which communicates by an avenue a mile and a half long with the town proper. Pop. (white) about 5,000.

Bulb, the name given to a leaf bud belonging to certain perennial herbaceous plants, and particularly to the monocotyledons. It is always underground, and is supported by a kind of solid and horizontal plate lying between it and the true root. To this flattened portion the fleshy scales of which the bulb is externally formed are fixed by their base. The interior contains the rudiments of the flower-stalks and leaves. The outermost scales are thin and dry like paper, but they become more fleshy and succulent in the interior. Sometimes the scales are of one piece, a single scale embracing the whole circumference of the bulb, as in the onion and the hyacinth. They are then named "coated" or "tunicated bulbs." At other times the scales are smaller and free at the sides, and cover one another only in the manner of tiles on a roof, as in the white lily. Lastly, the coats are sometimes so close as to be confounded together, so that the bulb seems as if formed of a solid and homogeneous substance. Such bulbs are called "solid," and they are exemplified in the common saffron. Bulbs again are either "simple," as in the tulip or squill, or they are "multiple," or formed of several small bulbs collected under the same envelope, as in garlic. Bulbs are reproduced every year, but differently in different species, the new bulbs sometimes being formed in the centre, sometimes at the side, sometimes above, sometimes below the old bulbs.

Bulbul, búl'búl, a small, brilliantly plumaged thrush-like bird of the family *Pycnonotidae*, species of which are found in Asia, Persia, India, and South Africa. The South African one (*Pycnonotus tricolor*) is remarkable for becoming intoxicated by syringa berries and similar fruits, at which time it is easily captured and caged. The common Indian bulbul (*P. hamorrhous*) is a familiar and favorite bird of European residents, and often builds its nest in their gardens and on the verandas. The pugnacity of the males is utilized by the

natives for their amusement, the birds being caught and trained to fight for small prizes. The name "bulbul" was applied to the little Persian nightingale (q.v.), and first introduced into English poetry by Lord Byron, after which its praises were much sung by the poets of the day.

Bulfinch, Charles, American architect: b. Boston, 8 Aug. 1763; d. there, 15 April 1844. He was graduated from Harvard in 1781, for several years traveled in Europe, studying architecture, which he adopted as a profession upon his return in 1786. In 1793 he built the first theatre in Boston. In the course of his career he designed more than 40 churches and public buildings in New England. Among them were: the State house, Suffolk county courthouse, Massachusetts General Hospital, and remodeled Faneuil Hall in Boston; the State prison and MacLean Asylum, at Charlestown; the county jail and University Hall in Cambridge; and the State house in Augusta, Me. From 1817 until its completion in 1830 he was the architect of the national capitol at Washington. Consult: Ellen Bulfinch, 'Life and Letters of Charles Bulfinch, Architect' (1896).

Bulfinch, Thomas, American author: b. Boston, Mass., 15 July 1796; d. there, 27 May 1867. He graduated at Harvard University in 1814. Although engaged in business he managed to devote considerable time to literature. Among his best-known works are 'The Age of Fable' (1855); 'The Age of Chivalry' (1858); 'Legends of Charlemagne' (1864); 'Oregon and Eldorado' (1866).

Bulgaria, búl-gār'ēa, or bool-gā'rēa, a principality in Europe, bounded north by the Danube and Rumania; east by the Black Sea; south by Turkey; and west by Servia; capital, Sofia. It has an area of 38,080 square miles. Its surface is a gradually sloping plain, broken by occasional mountains, which give rise to many rapid tributaries to the Danube. There is little mining, although the mountains are rich in minerals. The soil is excellent and the slopes of the mountains are richly wooded. The inhabitants, though not skilled in agriculture, export a considerable quantity of grain, chiefly wheat. Fruit and vegetables are raised in abundance. Roses are largely cultivated for the production of the attar; 80,000 gallons of wine are made annually; silk worms are bred in some regions; and tobacco forms an important crop. Domestic industries are chiefly carpets, cloths, hosiery, and ribbons. The roads are very bad, and there is but a single line of railroad, about 500 miles, on the route between Vienna and Constantinople. All traffic is carried on by the rivers, and the export trade by the Black Sea. The government is Christian. There is a national militia, and military service is compulsory. The Bulgarians were originally a Tartar nation, which in the 4th century was settled on the Volga. The ruins of their former capital may still be seen in the neighborhood of Kazan. Their kingdom, which occupied a part of the Asiatic Sarmatia of the Greeks, was called Great Bulgaria, and is now comprehended in the Russian government of Orenburg. They afterward removed to the countries between the Bog and the Danube, and called their territories Second Bulgaria. The first Bulgarian kingdom south of the Danube was founded in the latter

half of the 7th century, but the Bulgarians who established it were comparatively few in number, and after their adoption of Christianity in the 9th century they became completely mixed up with the Slavonic inhabitants, though the whole became known as Bulgarians. The greatest ruler of this kingdom was Symeon (888-927), who subjugated the greater part of the peninsula, and raised the Archbishop of Bulgaria to a position independent of the Patriarch of Constantinople. Under the son of Symeon this empire fell to pieces. The western half broke off and formed a separate kingdom, with Ochrida in Macedonia for its capital; and the eastern portion was subdued by the Byzantine emperor, John Zimisces, who reincorporated it with the empire. The western Bulgarian kingdom existed only till about 1018, when it also was subdued by Basil II, "the slayer of the Bulgarians." Toward the end of the 12th century, however, the Bulgarians revolted and managed to establish a third kingdom between the Balkan range and the Danube, which, sometimes weak and sometimes powerful, continued to exist till the advent of the Turks. The last ruler of this kingdom was conquered by Bajazet I. about 1390, and for nearly 500 years the Turks ruled supreme. In 1876, on account of the atrocities of the Turkish soldiers, an insurrection broke out. Russia took the part of Bulgaria against Turkey, and the war of 1877-8 followed. (See BATAK.) By the first article of the Treaty of Berlin, 13 July 1878, the principality of Bulgaria was constituted, made tributary to Turkey, and placed under the suzerainty of the Sultan. In 1879, Alexander of Battenberg, a German prince, was chosen sovereign of part of Bulgaria, the rest being made a separate province called East Rumelia, to prevent Bulgaria from becoming a strong state. In 1885 there was a revolution in East Rumelia, which annexed itself to Bulgaria. Servia intervened, and Alexander was forced to abdicate. Against Russia's will, Ferdinand of Saxe-Coburg accepted the vacant throne in 1887. The government is that of a hereditary prince as chief executive, with responsible ministers and Legislative Assembly (one for every 10,000), elected directly by the people for three years; it pays annual tribute to the Sultan. Pop. (1910) 3,744,300: about 74 per cent. Bulgarians, 19 per cent Turks, the rest Spanish Jews, with a sprinkling of Greeks; 77 per cent are of the faith of the Orthodox Greek Church; only 2½ per cent Moslems.

Bulgarian Language and Literature. Bulgaria and the adjacent provinces of Macedonia are considered to have been the cradle of the old Slavic languages. The ancient Bulgarian language was the richest of them all, and was the scriptural language of the Greek-Slavic Church, and the great medium of ecclesiastical literature in the ancient Slavic lands. The Russian language is said to have been molded by missionaries of the Greek Church sent from Bulgaria about the 11th century, while the future empire was still in a state of semi-barbarism. The Russian tongue has preserved many inflections which the Bulgarian has lost. After the overthrow of the Bulgarian kingdom at the close of the 14th century, the grammatical structure and purity of the language became impaired by mixture with the Wallachian, Alba-

nian, Rumanian, Turco-Tartar, and perhaps Greek vernaculars; and the modern Bulgarian language has only the nominative and vocative of the seven Slavic cases, all the rest being supplied by prepositions. It has an article, which is put after the word it qualifies, like that of the Albanians and Wallachians. Among the ancient Bulgarian ecclesiastical literature must be mentioned the translations of the Bible by Cyril and Methodius, and the writings of John of Bulgaria in the 10th century. Grammars of the Bulgarian language have been published by Neofyt in 1835, and by Christiaki in the following year. Venelin, a young Russian scholar, sent to Bulgaria by the Russian archaeographical commission, published in 1837 a grammar and two volumes of a history of the Bulgarians, but died while he was engaged in preparing a third volume. A new grammar was given to the public by Bogojev in 1845, and finally in 1849, by the Rev. E. Riggs, an American missionary stationed at Smyrna, who also sent a Bulgarian translation of Gallaudet's 'Child's Book on the Soul' to New York. Dictionaries of the Bulgarian language have been compiled by Neofyt and Stojanowicz. A Bulgarian version of the New Testament was printed at Smyrna in 1840 for the British and Foreign Bible Society. The Bulgarian national songs are numerous, and are similar to those of the Servians. Czelakowsky's collection of Slavic songs contains a number of Bulgarian songs. Bogojev has published several historical poems. Among more recent writers may be mentioned the poet Christo Boteff, and the poet-novelist Ivan Vazoff, while a publication on the subject of education has appeared from the pen of Neofyt.

Bulgarin, Faddéi Venediktovich, fā-dā'ē vā-nā-dik'tō-vich bool'gār-in, Russian author: b. Minsk, 1789; d. 13 Sept. 1859. He served in the Russian army, but, finding himself neglected, in 1810 joined Napoleon. In 1819 he returned to St. Petersburg, where his writings soon attracted notice by their intense satire and servility. In 1825 he started the *Ssevernaja Ptchela* (*Northern Bee*), a daily paper, which for long was alone permitted to discuss political questions. A zealous supporter of reaction and of absolutism, he enjoyed, through relations with the secret police, an unlimited power. He was a witty and versatile writer, and published travels, histories, novels, and statistical works.

Bulgaris, bool-gā'rēs, Demetrius, Greek statesman: b. Hydra, 1803; d. Athens, 11 Jan. 1878. While a young man he held office in his native city and took a prominent part in the Grecian war for independence. In 1831, after the downfall of Cape d'Istria, he had charge of the administration of the Department of Marine; but on the accession of King Otho he retired from office. After the revolution of 1843 he was a member of the Senate, and from 1848 to 1849 was minister of finance in the Cabinet of Canaris. During the Crimean war he was at the head of the Cabinet and as minister of the interior put an end to internal disorder and conciliated the powers. In 1857 he resigned and entered the Senate as a leader of the opposition. At the outbreak of the revolution of 1862 he was made regent, and chose Canaris and Rufos as his colleagues, but was deposed by the former. In 1865, 1872, and 1874-5 he was again at the head of the Cabinet.

BULGARUS — BULL

Bulga'rus, Italian jurist: b. Bologna in the 11th century; d. 1166. He was one of the famous group of writers known as the "Four Doctors" of Bologna, and his most noted work is a legal commentary, 'De Regulis Juris.'

Bulim'ia, a disease characterized by insatiable hunger. Persons suffering from this disorder are never satisfied. When the stomach is surfeited they throw off the food they have taken, half-digested, and with violent pain. It frequently occurs in the insane, in cases of paresis, etc., and usually appears as a concomitant of other diseases, as certain intermittent fevers, and diseases of the stomach and bowels, particularly such as are produced by the tapeworm.

Buli'mus, a genus of land-snails of the family *Helicidæ*, the species of which are mainly restricted to South America, especially Peru, Ecuador, and Bolivia. Some of the species are very large, as are also their eggs, those of *B. oblongus* being about the size of a sparrow's. There is an egg of another species in the British Museum which measures exactly one and three fourths inches in length.

Bulkeley, Morgan Gardner, American politician: b. East Haddam, Conn., 26 Dec. 1837. At the age of 15 he entered a mercantile house in Brooklyn, N. Y., and in a few years became a partner in it. When the Civil War broke out he went to the front as a private in the 13th New York regiment, and served during the McClellan-Peninsula campaign under Gen. Mansfield at Suffolk, Va. In 1872, he came to Hartford, organized and became president of the United States Bank in that city, and later was elected president of the Aetna Life Insurance Company, a position he still holds (1903). For 30 years he has been a prominent figure in local and state politics. He was four times elected mayor of Hartford, 1880-8, and in 1889 was elected governor. At the State election in November 1890 the first gubernatorial election under the new secret ballot law, the Democratic ticket received a considerable plurality over the Republican ticket; but a majority being necessary to elect, there was some doubt whether there had been a choice by the people for governor or treasurer. Accordingly the matter went before the General Assembly, which met in January 1891, and in which the Republicans had a majority of four on joint ballot, the Senate being Democratic. A long contest ensued between the two Houses, the Senate claiming the election of the recent Democratic candidates, and refusing to recognize in any manner Governor Bulkeley and the other hold-over Republican officials. The matter was finally settled on 5 Jan. 1892, when the State supreme court, in the *quo warranto* suit brought against Governor Bulkeley by the Democratic candidate for governor, found "Morgan G. Bulkeley to be governor, both *de facto* and *de jure*," and his right to hold over till both houses of the General Assembly should unite in declaring the election of his successor was affirmed. As the two houses could not agree the governor remained in office for another full term. In November 1892 the Democratic ticket swept the State. Governor Bulkeley has since, as chairman of the Connecticut highway and bridge commission, interested himself earnestly in trying to procure a fine stone bridge across the Connecticut at Hartford.

Bulkeley, Peter, American colonist and clergyman: b. Bedfordshire, England, 31 Jan. 1583; d. Concord, Mass., 9 March 1659. He was educated at Cambridge, and for 21 years was rector of a Bedfordshire parish. Being removed from this by Archbishop Laud, for non-conformity to certain ceremonies of the Church, he left England and became the first minister at Concord, in the colony of Massachusetts, of which famous town he was the chief founder. He was the author of some Latin poems, which are contained in Cotton Mather's 'History of New England'; also of some English verse, and of a theological treatise, 'The Gospel Covenant Opened,' published in London in 1646. He was as remarkable for his benevolence and kind dealings as for the strictness of his virtues.

Bulk'head, the name given to a variety of forms of partition. In its nautical sense a bulkhead is a wall or partition extending across the ship for the purpose of dividing the hold into compartments, for separating classes of merchandise, for strengthening the vessel, or more especially for confining water which may leak in, to the compartment in which the breach occurred. In large vessels longitudinal bulkheads are employed, as well as those running athwartships, and communications between the compartments are maintained by means of doors which can be instantly closed in case of accident and for the purpose of maintaining forced draught. One of the most important bulkheads in a ship is the one farthest forward, which is built with great strength, being designed to withstand the shock of ramming another vessel, an iceberg, etc., and confining the damage to a small portion of the vessel. It is hence known as the collision bulkhead. Another form of bulkhead is a strong framework used in the construction of tunnels, to prevent the irruption of water, quicksand, etc., into the workings. The term is also applied to the facing (generally of timber) that supports the seawall of a harbor, and somewhat illogically to the sloping flap doors often used to cover the entrance of a dwelling-house cellar.

Bull, Charles Stedman, American physician. He was graduated from Columbia College in 1864, and at the College of Physicians and Surgeons in 1868. He is surgeon to the New York Eye and Ear Infirmary, consulting ophthalmic surgeon to St. Luke's and Presbyterian hospitals, and St. Mary's Hospital for Children. He is professor of ophthalmology in Cornell University. He has written: 'Eye Defects Which May Cause Apparent Mental Dulness and Deficiency in Children' (1901); 'Tuberculosis of the Eye' (1900); both in the 'Transactions' of the New York Academy of Medicine; 'Vascular Tumors of the Orbit' (1900), and other articles on his specialty in the 'Transactions' of the American Ophthalmological Society, the 'Medical News' and 'Medical Record.'

Bull, George, English bishop: b. Wells, Somersetshire, 25 March 1634; d. 17 Feb. 1710. Having graduated with distinction at Oxford, he was ordained at the early age of 21, and soon became rector of St. George's, near Bristol. Here he made himself beloved by all, and kept his parish in peace during those troublesome times. In 1658 he became rector of Sud-

BULL—BULL-BAITING

dington St. Mary's in Gloucester, and in 1662, of **Suddington St. Peter's**. In 1669 he published in the Latin tongue his most important work, called '*Harmonia Apostolica*,' an attempt to reconcile the apparent contradictions between St. James and St. Paul on the doctrine of justification. This publication extended his fame to foreign countries, and his reputation procured him a stall in the cathedral of Gloucester. In 1705 he was promoted to the bishopric of St. David's. See edition of his works, with a life, etc., Clarendon Press, Oxford (1827).

Bull, George Joseph, Canadian ophthalmic surgeon: b. Hamilton, Ontario, 16 Feb. 1848. He was graduated at McGill University in 1869, studied in Paris, and began the practice of medicine in Montreal, devoting himself especially to diseases of the eye. He made his residence in Paris in 1886, and has won celebrity as an expert in ophthalmic subjects. He has written '*Ophthalmia and Optometry*,' and many similar works.

Bull, John, English musician: b. Somersetshire, about 1563; d. Antwerp, 12 March 1628. He was appointed organist in the Queen's Chapel in 1591; first music lecturer at Gresham College in 1596; and organist to James I. in 1607. A Catholic, he fled beyond the seas in 1613, and at Brussels entered the archduke's service. In 1617 he became organist at Antwerp cathedral. Little of his music has been printed. The claim advanced for his authorship of '*God Save the King*,' is unfounded.

Bull, John, the popular name of personification for the English nation. Its origin is obscure. Its first literary use appears to have been in Arbuthnot's famous '*History of John Bull*,' written in ridicule of the Duke of Marlborough. The name is also used for an Englishman.

Bull, Ole Bornemann, ô-lê bôr'ne-mân bûl, Norwegian violinist: b. Bergen, 5 Feb. 1810; d. near there, 17 Aug. 1880. He secured great triumphs both throughout Europe and in America by his remarkable playing, which won for him a distinct and unique position in the musical world as a virtuoso of extraordinary talent and mastery of the violin. He conquered serious discouragements in preparing for his career, throughout which public interest and admiration were no less awakened by his manliness and grace of bearing than by his skill as a musician. At his début (Paris 1833) he was honored by the presence of Paganini, and that master was witness to the young aspirant's triumph. Bull afterward studied and turned to good account the method of Paganini. In business life he met with various successes and reverses. He lost all his money in a scheme to found a colony of his countrymen in Pennsylvania, and had to take to his violin to repair his broken fortunes. He afterward married in this country, settled at Cambridge, Mass., and retained a summer residence in Norway. Consult: '*Ole Bull: A Memoir*' by Sara C. Bull (Boston 1883).

Bull, Papal, an authoritative letter issued by the Roman pontiff acting in his official capacity as head of the Church. A Papal Brief is also an official letter of the pontiff of a less formal and weighty character, and differs in

sundry particulars from the Bull, especially in its seal. The seal of the Bull, from which comes the name of the instrument is a *bullo* or globular mass of lead on which is impressed the name of the reigning Pope, also those of Saints Peter and Paul, abbreviated, S. Pe, S. Pa. The material of the Bull is parchment, but of the Brief, white paper; and the seal of the Brief is of red wax, stamped with the Fisherman's Ring, which gives the impress of St. Peter in a boat fishing. There are other peculiarities in matter and manner distinguishing the Bull from the Brief, but it suffices to note the foregoing. Of Papal Bulls that have played a signal part in history ecclesiastical or civil especially worthy of mention are the Bull *Clericis laicos* (1296) of Boniface VIII. by which the French clergy were forbidden to pay taxes to King Philip the Fair unless these were approved by the Pope; the Bull *Exsurge Domine* of Leo X. against Martin Luther (1520); the Bull *In Coena Domini* against heretics and fautors of heresy, dating from the 15th century, but re-enforced by Pius V. in 1571 and ordered to be publicly read in all parish churches yearly on Holy Thursday; the Bull *Unigenitus* (1713) against Quietism and Jansenism; the Bull *Dominus ac Redemptor*, of Clement XIV., abolishing the Jesuit order (1773), and the Bull *Pastor aeternus* (1870), which defined papal infallibility.

Bull, a ludicrous speech in which the ideas combined are totally incongruous or contradictory. A good example is Artemus Ward's saying of Jefferson Davis that "It would have been money in Jefferson Davis's pocket if he had never been born."

Bull and Cow, the names given by English-speaking races from time immemorial to the male and female respectively of bovine cattle. The words are probably imitative, the root-idea of "bull" being a suggestion of its bellowing; while "cow"—which in early English, as yet in Scotch and some provincial dialects, is pronounced *coo*—is imitative of the lowing call to the calf. Since these animals have become domesticated, and most of the males been castrated, the term has come to mean more particularly an unmutated ox. On the other hand, the large size and robust qualities of the bull have led to a transference of the term to the males of various other animals having no zoological resemblance, or very little, to the cattle. Thus we speak of "bull and cow" elephants, moose, wapiti, seals, whales, and even alligators; while various animals, as the bull-snake take the name as expressive of some bull-like quality, as a habit of snorting, or because of horn-like appendages (for example, bullhead catfish).

Bull-baiting, the sport of setting dogs on a bull, which was tied to a stake and torn to death for the amusement of the spectators. In this case the dogs, which were set upon the bull singly, were trained to seize the bull by the muzzle, technically, "to pin" the bull; but they were very frequently tossed on the horns of the animal. Sometimes also the bull was allowed to run loose in the arena, and then several dogs were set upon him at once. Bull-baiting was a favorite sport in England till about the time of George IV.

BULL-DOG—BULL RUN

Bull-dog, a dog of moderate size, derived previous to the 13th century, from a cross between the old British mastiff and the large pug of extreme southeast Asia. Both its ancestors still exist as separate breeds. An average mature specimen will weigh 40 to 50 pounds. They are squat and muscular in build, with short legs, rather higher behind than in the front, especially if the front legs are very much bowed. Their chests and heads are abnormally broad for their size. The lower jaw overlaps the upper and is of extraordinary strength. The teeth are large, especially the two canines, and very strongly fixed in the jawbone, giving the dog a holding power beyond that of any other breed. The coat is close and short. The most variable feature is the color, which ranges from all black to all white among dogs bred for show purposes, but a brindle is more natural. For many centuries this dog was used for "baiting," or biting at, the bull, as a popular recreation; and up to more recent times men of brutal disposition used it for public dog-fights. It was through these exhibitions that the bull-dog got his bad name for temper, but now he is mainly kept as a watch-dog. In that capacity he is invaluable, and so gentle is his disposition that he is the safest canine companion for children. About the year 1900 a small variety of the bull-dog was evolved in the neighborhood of Brussels, but as it was first shown in Paris it has always been known as the "French" bull-dog. It is in the main a miniature of the English bull-dog. The most notable difference, other than that of size, being that the ears are shaped like those of a bat, and are carried erect, or "pricked," giving the animal a very alert, sharp look.

Bull-fight, a contest between men and bulls, conducted as a public spectacle. Once popular in Greece and Rome, this form of entertainment was introduced by the Moors into Spain, and universally adopted in the cities of the kingdom, where, as well as in Mexico and some other parts of the world, it is still much in favor. The bull-fight is held in an arena of greater or less magnificence, called in Spanish the *plaza de toros*. The bulls are turned out, one by one, with many forms of pomp and solemn ceremonial, into the open space, where they are assailed, first by horsemen, called *pica-dores*, who attack them with the lance; then, when one or more horses have been wounded, and one or more men have met with injury or perilous mishap—in which case a crowd of active footmen, called *chulos*, provided with crimson banners, take off the attention of the bull—the *banderilleros*, armed with sharp-barbed darts with fireworks and flags attached to them, worry the bull until he is covered with shafts, bleeding and scorched, his glossy hide black and crisp from the explosion of the fireworks. Then comes the last act of the tragedy, when the skilful *matador* enters the arena slowly and alone, clothed in plain black, and armed with a long, straight sword and a stick, called a *muleta*, with a piece of red silk fastened to it. With his sword he seldom fails to give the *coup de grace* to the tortured bull, sheathing the blade, with one sure thrust, up to the hilt in his body just at the juncture of the neck and spine. Mules drag out the slaughtered carcass, amid the sound of trumpets and acclamations

of the spectators; the dead or dying horses are removed; the arena is strewn with fresh sawdust; another bull is introduced; and so goes on the combat, until perhaps a score of bulls and a larger number of horses have been slaughtered to delight the spectators. The Spanish settlers of Mexico and South America introduced bull-fighting to the New World.

Bull-frog, a widely distributed, edible North American frog (*Rana catesbyana*) found in sluggish waters throughout the eastern half of the United States and Canada, and so called because of its loud, bass voice. It is from five to eight inches long, and of various shades of green, with the legs spotted. It lays its eggs in strings and the tadpole does not reach maturity until two years old. The same name is given by English-speaking people in various parts of the world to other large bellowing frogs, as the "bull-frog" of Siam and Malaya (*Callula pulchra*). See FROG.

Bull, Golden. See GOLDEN BULL.

Bull Run, First Battle of. The first great battle of the Civil War occurred Sunday, 21 July 1861, in the vicinity of Manassas, Va. The Union forces were commanded by Brig.-Gen. Irvin McDowell, the Confederates by Gen. Joseph E. Johnston, who had arrived from Winchester at noon of the 20th with nine regiments of his army, and assumed command. The battlefield was west of Bull Run, and near the crossing of that stream by the turnpike running nearly west from Alexandria to Warrenton. This road, a mile and a half west of the Stone Bridge by which it crossed Bull Run, unexpectedly to the Confederates, became the axis of the battle. Bull Run is a narrow, winding stream with rugged and mainly precipitous banks, but with numerous fords, flowing southeastwardly, being about 25 miles west of Alexandria, and from three to five miles east of Manassas.

McDowell marched from his camps in front of Arlington and Alexandria on the afternoon 16th July, with five divisions, commanded respectively, by Brig.-Gen. Daniel Tyler, four brigades; Col. David Hunter, two brigades; Col. S. P. Heintzelman, four brigades; Brig.-Gen. Theodore Runyon, two brigades; and Col. Dixon S. Miles, three brigades. The Fourth Division was left as a reserve in the region of Fairfax, guarding the lines of communication. The advance division, Tyler's, reached Centreville the morning of the 18th and sent a brigade to Blackburn's Ford in reconnaissance. After a sharp skirmish in which both sides lost about 60 men, it withdrew toward Centreville, to which point McDowell, hearing of the operations at Blackburn's Ford, directed the concentration of four divisions.

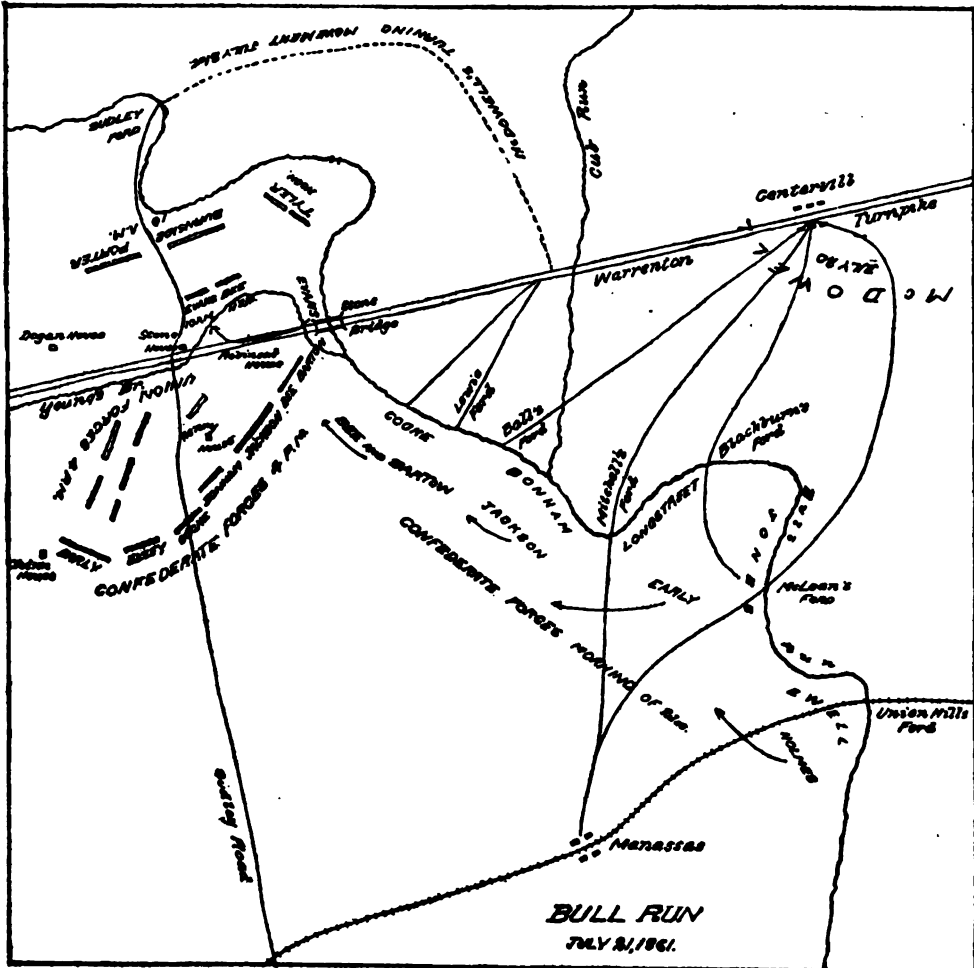
The Confederate "Army of the Potomac" had been concentrated at Manassas under Gen. Beauregard. In expectation of a Union advance it occupied the south bank of Bull Run for eight miles from Union Mills Ford, at the crossing of the railroad to Alexandria, to the Stone Bridge at the Warrenton turnpike, three brigades being thrown forward of that position, one of them to Fairfax Court House. These brigades fell back before the Union advance, skirmishing slightly. Ewell's brigade, the right of the line, was at Union Mills, with Holmes in support; Jones' brigade at McLean's Ford; Longstreet's at Blackburn's Ford; Bonham's be-

BULL RUN

tween Mitchell's and Ball's fords; Cocke's at Lewis' Ford; and Evans' demi-brigade at the Stone Bridge forming the Confederate left. Of Johnston's Army of the Shenandoah, Jackson's brigade was in support of Bonham, and Bee and Bartow in support of Cocke.

From each of these fords fair roads led to Centreville. Gen. Beauregard had planned an attack upon Centreville which involved an advance of his whole force upon that point. This was officially approved by Gen. Johnston before daylight of the 21st, but at sunrise it was rendered impossible by McDowell's initiative. The

bridge, discovering the movement, withdrew 11 companies and formed them on a ridge half a mile north of the road as the head of Hunter's column entered the open fields which extended a mile north of the Warrenton road. Evans made stubborn resistance, and was soon supported by Bee's brigade, and Imboden's battery. While the position was hotly contested the Confederates were pressed back down the hill, across the valley of Young's branch, a tributary of Bull Run, to the plateau south of it upon which were the Robinson and Henry houses. Two of Tyler's brigades crossed above the Stone Bridge



plan was then changed to an attack on the Union left from Blackburn's Ford. This also was abandoned from the same cause.

McDowell, who had first intended to attack the enemy's right, after the affair at Blackburn's Ford, finding the ford at Sudley Spring two miles beyond the Confederate left, decided to attack from that direction. While Tyler feinted before the Stone Bridge, Hunter and Heintzelman, by a long detour, crossed at Sudley Spring and moved south toward the Warrenton turnpike in the enemy's rear. Evans, at the

and joined Hunter and Heintzelman in their advance. The fighting continued desperate until noon, and for new troops was, for both sides, most remarkable, but the Confederate line, though stubbornly contesting the ground, began to disintegrate, and the road to Manassas was crowded with retiring soldiers.

Gen. Johnston describes the Confederate situation at two o'clock as "critical"; Gen. Beauregard terms it a "pressing exigency," and speaks of the retirement of "our shattered battalions," and of the fighting line as having "lost its cohe-

BULL RUN

sion." Dr. Jones, Jackson's distinguished biographer, records that "the retreat became every moment more disordered," that Bee's quick eye "now told him that all was lost," and that "he could not reform his line."

At that hour a Union victory seemed assured. Johnston and Beauregard reached the position together. The troops on the line of Bull Run that had been held there by the demonstrations of two Union brigades designed to mask McDowell's turning movement, were ordered in haste to the new line which was at right angles to the first. Jackson soon arrived with five regiments and two batteries. Hampton's Legion joined him, and the Union advance was checked. Other arrivals strengthened the line. Kirby Smith's brigade of Johnston's army appeared about three o'clock, having just arrived on the field from Manassas, and pushed its three regiments toward the right of the Union line. Early's brigade of Beauregard's force, from the extreme right of his line, hastened beyond Smith's brigade, now commanded by Col. Elzey, and supported by Stuart's cavalry, appeared directly on the Union right flank. Two regiments from Bonham, and two from Cooke, also arrived upon the Union right. These also were of Beauregard's army. This turned the check which that portion of the Union line had received, first into retreat, and then into a disorganized withdrawal, except that the rear guards maintained fair order till the columns were well off the field, the right retracing its long detour by Sudley Spring. At Cub Run, half-way to Centreville, the batteries of a pursuing column broke up the wagons and batteries on the bridge, compelling the abandonment of 13 guns. From this point the movement to the rear was still farther disorganized, to which condition the vehicles of many visitors, congressmen, correspondents and officials largely contributed. The attempt to rally the troops at Centreville failed, though Gen. Johnston reported that the "apparent firmness" of the Union reserves at that point checked the pursuit. The army, in great part disorganized, streamed on to Washington.

After the severe stress in which the Confederate leaders found themselves from 11 o'clock until about 3, the sudden change on the Union side, first from assaulting to cessation of fighting; next, to a general retreat, and, later, to widespread panic, was as much a surprise to the enemy as to the Union commanders. It was not until the second day after the battle that the Confederates ascertained the full extent of the Union stampede. Upon this point President Davis wrote Gen. Beauregard: "You will not fail to remember that, so far from knowing that the enemy was routed, a large part of our forces was moved by you in the night of the 21st to repel a supposed attack upon our right, and the next day's operations did not fully reveal what has since been reported of the enemy's panic."

McDowell's strength at Centreville appears to have been about 28,000 men and 49 guns. His report says he crossed Bull Run with 18,000 men. A very careful estimate made from official records in 1884, by Gen. James B. Fry, McDowell's adjutant-general at the battle, gives the number actually engaged as 17,676.

Gen. Beauregard reported his strength on the field when the battle opened at 27,833 and 49 guns; and after Johnston's delayed troops and Holmes' brigade had arrived in the afternoon as

31,972 and 57 guns. A very careful estimate by Gen. Thomas Jordan, his adjutant-general, fixed the number actually engaged at 18,053, thus showing the two sides to have been about equal on the firing line.

The Union loss as reported was: Killed, 460; wounded, 1,124; missing, 1,312; total, 2,896. Union guns captured or abandoned, 29.

The Confederate loss reported was: Killed, 387; wounded, 1,582; missing, 13; total, 1,982.

H. V. BOYNTON.

Bull Run, Second Battle of, 30 Aug. 1862. When McClellan on the peninsula had reached the vicinity of Richmond, Lee, to prevent McDowell's corps at Fredericksburg from re-inforcing McClellan, ordered Jackson in the Shenandoah to make a demonstration that should detain all available troops for the defense of Washington. Jackson advanced, and in a brilliant campaign drove Banks out of the valley, and forced him across the Potomac. By a masterly retreat, he regained the upper valley in spite of McDowell and Fremont, and soon after appeared on McClellan's flank at Mechanicsville and participated in the seven days' battles.

On 27 June the Union authorities united the three corps of McDowell, Fremont, and Banks into the Army of Virginia under the command of Maj.-Gen. John Pope. He had concentrated his forces between Sperryville and Warrenton, and began to operate with his cavalry against Lee's railroad lines about Gordonsville. His mission also was to prevent Lee from concentrating upon McClellan, when he should withdraw from the peninsula. Lee promptly sent Jackson's Division, followed by Ewell's and A. P. Hill's, to Gordonsville. On 7 August these moved from Gordonsville toward Pope's position at Culpeper, and 9 August encountered Banks at Cedar or Slaughter Mountain. Banks attacked, instead of holding his position as Pope's plan contemplated, and while at first brilliantly successful, he was at last defeated. Jackson, however, retreated on the 11th across the Rapidan.

On the 13th Lee ordered Longstreet, with his own and Hood's divisions, to Gordonsville. R. H. Anderson's division was ordered to follow. Upon their arrival Pope was largely outnumbered. Lee planned a move for the 18th against Pope's left, but this officer learned of the plan through the capture of Stuart's adjutant-general, re-crossed the Rappahannock, and took position behind it on the 20th. Lee next arranged to cross at Sulphur Springs, turn Pope's right, and move upon his communications. This failed. Pope, at the same time, had planned to cross the river and attack Lee's right and rear, but a sudden flood prevented the movement. Lee then sent Jackson's corps far beyond Pope's right by way of Salem and Thorofare Gap to cut Pope's railroad line at Manassas. Jackson succeeded, passing around Pope's right, capturing Bristoe Station and Manassas with its immense supplies on the night of 26 August. Pope moved to attack him at Manassas. On the night of the 27th and early on the 28th, Jackson's three divisions withdrew by different roads, and soon after noon of the 28th assembled on the battlefield of the first Bull Run.

On the night of the 25th Pope's headquarters were at Warrenton Junction. Reynolds' Division had joined him on the 23d. On the 25th the

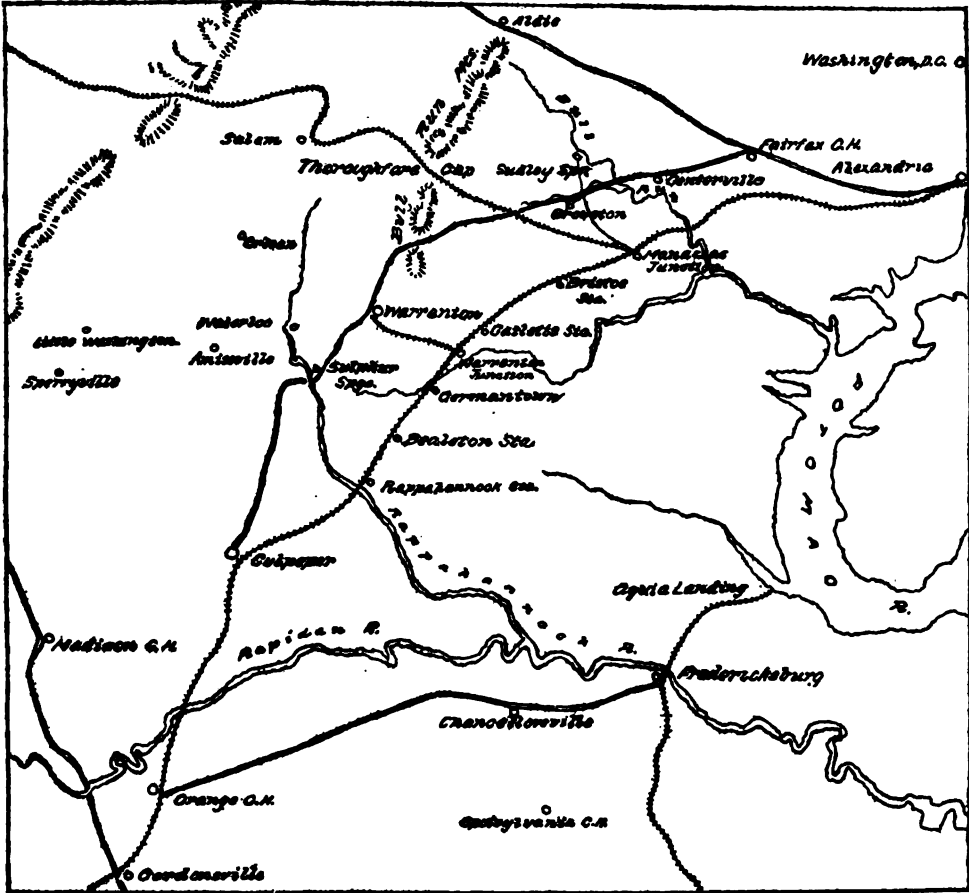
BULL RUN

advance of Heintzelman's corps arrived from the Army of the Potomac, Hooker's and Kearny's divisions, and Fitz-John Porter, with the divisions of Sykes and Morell of his corps. These two corps with Reynolds' Division were the only re-inforcements that Pope received from the Army of the Potomac until after the battle of Manassas.

On the night of the 27th Pope, supposing Jackson at Manassas, ordered general concentration in that direction. Porter's failure to move promptly under this order constituted one

Jackson was just north of it on the first Bull Run field. The Union approach led Jackson to attack, thus revealing his position, which Pope had been vainly seeking. This was the battle of Gainesville, being a very bitter fight between Taliaferro's Division and two brigades of Ewell, and King of McDowell's advance.

After the close of the fight, in the absence of McDowell, his two divisions retreated, Rickett's to Bristoe Station, and King's to Manassas. At daylight of the 29th the Union forces were again put in motion to pursue Jackson. His line was



THEATRE OF SECOND BULL RUN CAMPAIGN

of the charges under which he was subsequently court-martialed and cashiered. Rickett's Division, the rear of McDowell's corps, upon the information from the cavalry that Longstreet's forces were entering Thoroughfare Gap, moved to the gap and held Longstreet back during the day, and into the evening of the 28th. In the afternoon of the 28th Pope, supposing Jackson east of Bull Run, ordered his army to Centerville, Heintzelman and Reno by the fords of Bull Run, McDowell, Sigel, and Reynolds by the Warrenton turnpike. The advance along the turnpike was begun without the knowledge that

mainly along an unfinished railroad, the left near Sudley Spring, and his right on high ground north of the Warrenton road overlooking Groveton. The Union forces attacked throughout the day, with brief intermissions. The contest was desperate, and Jackson's line, though hard pressed at various points, maintained its organization. Porter's failure to here attack the Confederate right was another of the charges under which he was tried. Subsequently, however, he was exonerated by the findings of an army board, and restored to his rank by act of Congress. McDowell arrived late, with King's Division.

BULL-SNAKE — BULLA

As it moved into action it encountered the head of Longstreet's column, which had achieved its junction with Jackson. In less than an hour, in a bloody contest, Hood's Division of Longstreet's force had ended the battle of Groveton. Such were the preliminaries of the Second Bull Run.

The battle of Manassas, the Second Bull Run, was fought 30 August, the day following the action at Groveton. The movement covered the ground of McDowell's and Johnston's battle of the year before. Jackson's line occupied the position from Sudley Spring to the heights overlooking Groveton. Lee, whose forces were now all up, formed Longstreet's line across the Warrenton turnpike on high ground about a mile west of Groveton. On this ridge he established a number of batteries under Stephen D. Lee and Walton. The line then turned east south of the turnpike, and extended toward the Sudley Spring road. The Confederate position south of the Warrenton road seemed not to be suspected by Pope. The fact that after the action of the afternoon before Jackson's troops had retired to their morning position Lee had withdrawn Longstreet's advance to form on better ground, misled Pope and caused him to insist that the enemy was retreating. At noon, after reconnaissances north of the road, he therefore ordered vigorous pursuit. Porter was to push west on the Warrenton pike followed by King's Division on his right and Reynolds' on his left. Ricketts' Division, followed by Heintzelman's corps, was to pursue on the Haymarket road. Sigel's and Reno's corps were the reserves.

About four o'clock Porter advanced with his own corps and King's Division pushed in on Jackson's line with great vigor, and assault followed assault, each made with great pertinacity. Lee seemed willing to let them continue in order to exhaust his opponents. At length Jackson sent for help, and Longstreet was ordered to his assistance. This officer had, however, posted his batteries so as to enfilade Jackson's front, and instead of sending troops, opened with a terrific flanking fire of artillery. The Union lines were repulsed with great loss. Nearly all of Pope's forces had been put in north of the turnpike and had been seriously repulsed. All Union support was now directed to defend the position against Longstreet's forces south of the Warrenton pike. The whole of Longstreet's line went forward toward the road with a rush. There were five divisions — Wilcox on the left, then Evans (Hood), Anderson, Kemper, and Jones. As soon as Jackson, north of the road, saw the advance of Longstreet he ordered his own line forward. The corps of Heintzelman and Reno resisted this attack, but were gradually forced back. The supreme struggle of the Union forces was to hold two elevated positions near the Henry and Chinn houses. The latter, known as Bald Hill, was carried by the Confederates, after persistent and sanguinary fighting. The Henry house hill was held against repeated assaults. The Union army was in retreat across Bull Run, and the possession of the hill was necessary to maintain an orderly retreat.

The Union troops remained in possession until eight o'clock, when the last of Pope's army moved unmolested toward the Stone Bridge, crossing Bull Run about midnight. The bridge was then destroyed and the Union army concentrated at Centreville. It was a Union defeat,

but not a rout. While there was much straggling, the main army had retreated in good order, and Lee did not pursue. In the management of the battle Lee had displayed his eminent generalship in a striking manner. Pope's chief error had been in persisting, before his attack was delivered, that the enemy was in retreat.

Pope was re-inforced at Centreville by the strong corps of Sumner and Franklin from the Army of the Potomac. Here also he found supplies. His army had fought for two days almost entirely without food or forage. Lee began pursuit the afternoon of the day after the battle, Jackson leading from Sudley Ford, and marching by a circuitous route toward Fairfax Court House, seven miles in rear of Centreville. Passing Chantilly, he turned toward the Warrenton turnpike and formed in front of Ox Hill, his right extending toward the pike. He was far in advance of Longstreet, and wholly without support. He was attacked by the two divisions of Reno under Stevens, and later by Kearny. Stevens and Kearny were killed, and Jackson was repulsed.

Longstreet came up at night, and at noon the next day (2 September) Pope's army was ordered by the authorities at Washington to withdraw within the defenses of the city. Pope's losses throughout the campaign from 16 August to 2 September were: Army of Virginia, killed and wounded 5,318, missing 2,787; Army of the Potomac, killed and wounded 3,613, missing 1,115; 9th Army Corps, killed and wounded 1,204, missing 319; Kanawha division, killed and wounded 64, missing 42; total killed and wounded 10,199; captured or missing 4,263. The Confederate losses are not fully reported, but the best estimates placed them at about 8,500. There are no official returns which enable a presentation of the exact strength of either army during the campaign up to 30 August, but the best estimate places the Union forces at about 65,000 to 70,000, and the Confederate at 54,000.

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H. V. BOYNTON.

Bull-snake. See PINE SNAKE.

Bull-terrier. See TERRIER.

Bull-trout. (1) A salmon-like trout of North America. See SALMON-TROUT. (2) The Dolly Varden trout (q.v.)

Bulla, a genus of mollusks called, from the thinness of their shells, bubble-shells. The shell is oval, ventricose, convoluted externally, or only partially invested by the animal. The animal has a large cephalic disk bilobed behind; the lateral lobe is much developed. It occurs in

BULLACE — BULLET

temperate and tropical seas from 25 to 30 fathoms. Over 50 recent species are known and 70 fossil, the latter from the Oölite onward.

Bullace, a small tree or shrub allied to the prunes. It is akin to the variety *Spinosa* (the sloe), but differs in having the peduncles and under side of the leaves pubescent and the branches slightly spinous, whereas the *Spinosa* has the peduncles glabrous, the leaves ultimately so also, and the branches decidedly spinous. It stands midway between the plum and the sloe. In England its fruit is used for making jam. The tree is seldom found in America.

Bullæ, miniature blisters, or blebs. They are larger than vesicles, with a large portion of cuticle detached from the skin and a watery transparent fluid between. The skin beneath is red and inflamed.

Bullant, Jean, zhôn bú-lân, French architect: b. probably in Ecouen about 1515; d. Paris, 10 Oct. 1578. He studied at Rome and after his return to France became supervisor of the royal buildings. He was connected with the erection of the Tuileries and built the pavilion named for him. He was also the architect of the Hôtel de Soissons for Catherine de Medici. In 1570 he succeeded Primaticcio at Fontainebleau.

Bullbat, a name in the Southern States for the nighthawk (q.v.), a bird which flies in the dusk like a bat, and makes a booming sound.

Bulle, búl-lé, Konstantin, German historian: b. Minden, 30 March 1844. He studied philosophy and history at Jena and Bonn, taught in the high school at Bonn and became director of the gymnasium there in 1879. In 1887-90 he was a member of the Reichstag. After some philosophical studies he devoted himself to historical work and wrote: 'History of Recent Times 1815-71'; 'History of the Years 1871-7' and 'History of the Second Empire and the Italian Kingdom.' The first two were combined and published as 'History of Recent Times' in 1886.

Bullen, búl'lén, Frank Thomas, English author and lecturer: b. Paddington, London, 5 April 1857. He received but scanty schooling, and after a few years' experience as errand boy, etc., went to sea as ordinary seaman in 1869, becoming chief mate after several years. He left the sea in 1883 and was junior clerk in the English meteorological office, 1883-99. His contributions to nautical literature have attracted widespread attention. The earliest of these, 'The Cruise of the Cachetot' (1898) being the most noted. His other books include: 'Idylls of the Sea'; 'The Log of a Sea Waif' (1899); 'The Men of the Merchant Service'; 'With Christ at Sea'; 'A Sack of Shakings' (1901); 'The Apostles of the Southeast'; 'Deep Sea Plunderings' (1901); 'A Whaleman's Wife' (1902).

Buller, búl'lér, Sir Redvers Henry, English general: b. Devonshire, 1839; d. London, 2 June 1908. He joined the 60th Rifles as ensign in 1858; in 1862 was promoted lieutenant, and eight years later captain. He was major in 1874, lieutenant-colonel in 1878, colonel in 1879, and major-general in 1884. He served with his regiment in the Chinese campaign of 1860, and on the Red River expedition in 1870. During the Ashantee war he acted as quartermaster-

general and head of the intelligence department, and gained special mention for his behavior in several engagements. He also served with distinction during the Kaffir war of 1878, and the Victoria Cross was conferred on him in 1879 for his gallant conduct in saving the lives of two officers and a trooper of the Frontier Light Horse during the retreat at Inhlobane in the Zulu campaign. He was chief of the staff to Sir Evelyn Wood in the war against the Boers in 1881, and in Egypt in the following year, gaining special distinction for his services at Kassassin, Tel-el-Kebir, and elsewhere. In the Sudan campaign of 1884-5 he was chief of the staff to Lord Wolseley, and was in command at the battle of Abu-klea when Sir Herbert Stewart had been wounded. From 1887 till 1890 he held the post of quartermaster-general of the army, and from 1890 till 1897 he acted as adjutant-general to the forces. In 1886-7 he was under-secretary to the lord-lieutenant of Ireland, and in 1891 was promoted to the rank of lieutenant-general. He was created K.C.M.G. in 1882, K.C.B. in 1885, and G.C.B. in 1894. In 1899 he went to Natal as commander in the war with the Boer republics, and succeeded in relieving Ladysmith after it had been besieged 118 days. His various reverses prior to this event caused him to be superseded by Gen. Roberts, and on his return to England he was placed on the retired list in consequence of an unwise speech of his. The publication of official documents, still later, practically destroyed his reputation as a commander, it being shown by these he had advised Gen. White, the defender of Ladysmith, to give up the defense and surrender to the Boers.

Bullers of Buchan, a large oval cavity in the rocks on the east coast of Aberdeenshire, about six miles to the south of Peterhead, forming a sort of pot or caldron about 150 feet deep, open to the sky above and communicating with the sea below by a natural arch or horizontal passage, into which the waves often rush with a tremendous noise.

Bullet, the projectile used for small-arms, either spherical or of an elongated form. The elongated bullet is now in general use for rifles, and there has also been introduced some means of dilating the bullet at the moment of explosion, so that it is forced into the grooves of the rifle and exactly fits the barrel. In some cases there is merely a cavity left at the base of the bullet into which the gases formed on the explosion of the gunpowder are forced, so that these have the effect of dilating the bullet in the manner required. In other cases a plug is inserted in the cavity, which is driven forward by the explosion of the gunpowder, and has the same effect. Spherical bullets remained in use long after the invention of the rifle, though several kinds of elongated bullets were suggested by various inventors of the 17th and 18th centuries. In 1837 the French adopted an elongated bullet invented by Delvigne, but this was superseded by the Minié bullet about 1846. A similar form, but with a wooden plug instead of an iron cup to cause the expansion, was introduced into the English army with the Enfield rifles of 1855. Previous to this, in 1841, the Prussians had adopted the celebrated needle breech-loading rifle, with an egg-shaped bullet resting on a thick wad which alone took the

grooves of the rifle. In 1864 the three-grooved Enfield barrel was combined with the Snider breech-action in the rifles of the English army. The bullet supplied with this arm had a plug of baked clay and a hollow head, the lubrication being effected by bees'-wax placed in four cannelures running round its base. In 1866 the Chassepôt rifle was adopted by the French authorities, the bullet having shoulders serving the same end as the wad in the needle-gun bullet. The temporarily introduced Snider-Enfield rifles were replaced in 1874 by the much better Martini-Henry type, whose bullet, though longer and of smaller diameter, has the cylindrical form with domed end found in the French Chassepôt. The lubrication in this case was effected by a covering of wax-paper and a bees'-wax wad. The diminution in the diameter of the bullet was carried still further in the Enfield-Martini rifle of 1886, the bullets then supplied measuring only about two fifths of an inch in diameter; and in several subsequent types of rifle they are of still smaller diameter. This decrease in calibre has been accompanied by an increase in length in order to preserve the weight of the bullet, and it has also been found necessary to cover the lead of the bullet with a thin coating of some such metal as steel, copper, nickel, or German silver. These changes are all embodied in the bullets of the Lee-Metford magazine rifle, and the necessity for lubricators is thus done away with. The Lee-Metford bullet has a length of 3.05 inches, and the diameter of .312 inch. There is considerable variation in the weight of bullets. The old Brunswick bullets weighed 557, the Minié, 680 grains. The Enfield bullet had a weight of 535 grains; the Snider and Martini-Henry, 480; the Enfield-Martini, 384, while the Lee-Metford bullet weighs only 216 grains. The French Lebel magazine rifle has a bullet with a weight of 215 grains, and in a later French form, the Berthier, the weight is 205 grains. The Lebel bullet is flattened at the point in order to lessen the risk of explosion in the magazine. The German Mauser and Mannlicher magazine rifles have bullets of the same weight as the Lee-Metford. The slenderness of modern rifle bullets has necessitated the construction of rifles of very small bore, and this in turn has compelled the substitution of pellets of compressed powder for the older loose powder. In recent years a peculiar kind of bullet known as the Dum-Dum has been employed by English troops in warfare with uncivilized races, as the frontier tribes of India. In this the lead core is inserted from the top, not from the base, as in other bullets, and the lead being unprotected at the point, has to sustain the shock of the impact. The consequence is that it expands in the wound, and thus, even though it should pass right through a person's body, its effects are very severe, and likely to stop the onrush of the foe.

Bullet-tree, or Bully-tree (*Mimusops Balata* or *Sapota Mulleri*), a forest tree of Guiana and neighboring regions, order *Sapotaceæ*, yielding an excellent gum known as *balata*, having properties giving it in some respects an intermediate position between gutta-percha and india-rubber, and making it for certain industrial purposes more useful than either. The timber of the tree also is valuable.

Bullfinch, an European finch (*Pyrrhula europæa*), frequently kept as a cage bird, mainly because of its ability to learn to whistle tunes, the most capable birds, trained in Germany, acquiring as many as six. The training of "piping bullfinches" is a special art, and various domestic varieties are bred, some of which bring high prices. Its natural song is not remarkable. The bullfinch is a large bird of its kind, with a big inflated beak, and soft dense plumage. It is pearl-gray above and dull red on the under parts; the crown of the head, the beak, and the tail and wing quills are black, the latter crossed by a broad white bar. The colors of the female are duller than those of the male. Several similar species are known elsewhere, one (*P. casini*) inhabiting Alaska. See **CAGE BIRDS**.

Bullheads, or "horned-pouts," are small, dark-colored catfish, abundant everywhere east of the plains, and, by introduction, in California and Oregon. They are mud-loving fishes, remaining on the bottom and feeling for food with the barbels, one on each side of the mouth and two under the chin. The "common bull-head" (*Ameiurus nebulosus*) varies in length, at full age, from 18 to 24 inches, and occasionally weighs 5 pounds. It is brownish-black in color, with a fine, scaleless, rubber-like skin, a big head, and a long upper jaw. It is a gluttonous biter, gorging the bait, so that the hook must often be cut out of its interior. A smaller species, the black bullhead (*A. melas*) may be distinguished by the smaller anal fin and its nearly white rays. The southern "flat-headed cat" (*A. platycephalus*) has an eel-like form and a greenish brown hue, and is almost entirely herbivorous. Several of the large "cat-fish" (q.v.) of the western lakes belong to this genus.

Bulliard, Pierre, pê-âr bûl-yâr, French botanist: b. Aubepierre en Barrois, about 1742; d. Paris 1793. He was educated at the College of Langres, where he showed a decided taste for natural history, proceeded to Paris to pursue his medical studies, and employed his leisure in collecting the materials of a 'Flora Parisiensis,' which he afterward published in six volumes, with colored plates. Among his other works are a 'Herbier de la France,' and a 'Dictionnaire Élémentaire de Botanique,' which has been repeatedly printed.

Bullinger, Heinrich, hîn'rîñ bûl'ing-ër, Swiss reformer: b. Bremgarten, 18 Aug. 1504; d. Zürich, 17 Sept. 1575. He studied first at Emmerich, in the duchy of Cleves, and afterward at Cologne. His intention was to become a Carthusian monk, but after perusing the writings of Melancthon and other reformers he changed his views, formed a close connection with Zuinglius, became one of the most strenuous supporters of his views, and ultimately succeeded him in his charge of Zürich. He was one of the authors of the first Helvetic Confession, drew up in concert with Calvin the formula of 1549, by which the differences between the churches of Zürich and Geneva on the subject of the Lord's Supper were happily terminated, and kept up a close correspondence with the lately published by the Parker Society, con-principal English reformers. The Zürich Letters, tains part of this correspondence, and among others, letters addressed to him by Lady Jane Grey. The most important of his many writ-

ings is a 'History of the Reformation.' See lives by Hess (1828-9); Vestalozzi (1858); also Heinrich, 'Bullinger und seine Gattin' (1875); Zimmermann, 'Die Züricher Kirche und ihre Antistes' (1877).

Bullion, būl-yōn, uncoined gold or silver, in bars, plate, or other masses. United States standard bullion contains 900 parts of pure gold or pure silver, and 100 parts of copper alloy. The coining value of an ounce of pure gold is \$20.67183, and the coining value of an ounce of standard gold is \$18.60465. The coining value in standard silver dollars of an ounce of pure silver is \$1.2929, and the coining value of an ounce of standard silver is \$1.1636. The word bullion was of frequent use in the proceedings respecting the Bank of England from 1797, when the order of council was issued that the bank should discontinue the redemption of its notes by the payment of specie to 1823, when specie payments were resumed; for, by a previous law, the bank was authorized to pay its notes in uncoined silver or gold, according to its weight and fineness. The investigations of the bullion committees, and the various speculations on the subject of bullion, related to the supply of gold and silver, whether coined or not, as the basis of the circulating medium. The discovery of the mines in America did not at first add materially to the stock of bullion in Europe. The total addition for the first 54 years was about \$35,000,000; not quite so great an amount of value (in gold at least) as Russia has obtained from the Ural mines in less than half the time. The average annual supply from all the American sources during the 54 years from 1546 to the end of the 16th century, was rather more than \$10,000,000. During the 17th century the annual average was about \$16,250,000; in the next half century it was \$27,500,000; and in the years 1750 to 1803 it was \$38,000,000.

Bullock, Alexander Hamilton, American politician: b. Royalston, Mass., 1816; d. 1882. He was educated at Amherst College and the Harvard Law School and was admitted to the bar in 1841. After practising law in Worcester, Mass., he was elected to the Massachusetts House of Representatives in 1845 and re-elected in 1861, when he became speaker. In 1849 he became a member of the State Senate. He held many judicial offices, was mayor of Worcester in 1859, and from 1866-8 was governor of his State.

Bullock, Charles, English clergyman, editor and author: b. 24 Feb. 1829. He entered the Anglican ministry in 1855, was curate of Ripley, Yorkshire, 1857-9; of Luton, Bedfordshire, 1859-60; rector of St. Nicholas', Worcester, 1860-74. He has edited 'The Fireside Magazine,' 'Home Words,' and other periodicals, and among his published works are 'The Way Home'; 'The Royal Year'; 'England's Royal Home'; 'Shakespeare's Debt to the Bible'; 'Popular Recreation'; 'The Poet of Home Life'; 'Biography of Frances Ridley Havergal'; 'Crowned to Serve.'

Bullock, Charles Jesse, American economist: b. Boston, 21 May 1860. He graduated at the Boston University in 1889, devoted himself to special studies, and was appointed to the chair of economics in Williams College. He is the author of 'The Finances of the United

States, 1775-89' (1895); 'Introduction to the Study of Economics' (1900); 'Essays on the Monetary History of the United States' (1900); and has edited 'Currencies of the British Plantations in North America.'

Bullock, Rufus Brown, American politician: b. Bethlehem, N. Y., 28 March 1834; d. 27 April 1907. He was educated at Albion Academy and early in life went to Georgia in connection with a business enterprise. During the Civil War he was connected with the quartermaster's department in the Confederate army. In 1867 he became a member of the State Constitutional Convention of Georgia and in the following year was elected governor. His championship of the negro members expelled from the legislature brought him such violent opposition that he resigned from office. He was actively engaged in the promotion of the railroad and industrial interests of his own State and was government director of the Union P. R.R.

Bullock, Shan F., Irish novelist: b. Crom, Fermanagh, Ireland, 17 May 1865. He has written a number of popular works. Among them are: 'The Awkward Squads' (1893); 'By Thrasna River' (1895); 'Ring o' Rushes' (1896); 'The Charmer' (1897); 'The Barrys' (1899); and 'Irish Pastorals' (1901). His work is remarkably individual and his studies of life in the north of Ireland are faithful reflections of Irish life and character.

Bullock, William A., American inventor: b. Greenville, Greene County, N. Y., 1813; d. Philadelphia, 14 April 1867. He learned the trade of machinist, and having started a periodical, 'The Banner of the Union,' he invented a printing-press in connection with that enterprise. He removed to New York and devoted himself to the construction and gradual development of a "planetary press," finally producing the Web perfecting press that delivers 30,000 papers per hour, printed, cut and folded. While handling one of his presses he met with an injury that proved fatal.

Bulls and Bears, a popular phrase used in connection with the stock market. The term "bulls" is applied to the operators attempting to force up prices, and the term "bears" to those seeking to lower them.

Bull's Horn Coraline (so named because the shape of the cells is like a bull's horn), a zoophyte of the family *Cellariadae*. It is the *Eucratia loricata*. It is branched subalternate, and has the cells conical, with a raised orifice, beneath which is a spinous process.

Bulnes, Manuel, mā-noo-el' bool-nās, Chilean soldier and statesman: b. Concepcion, 25 Dec. 1799; d. Santiago, 18 Oct. 1866. He served in most of the battles of the Chilean revolution. In 1838 he commanded the Chilean army of 5,000 men against Santa Cruz, in Peru, and was finally instrumental in driving Santa Cruz from the country and breaking up the Peru-Bolivian confederation. In 1841 he was elected president of Chile and served for four years. He was afterward senator and councillor of state.

Bülow, Bernhard, bërnhärt bū'lō, Count von, German statesman: b. Klein-Flottbeck, Holstein, in the spring of 1849. He came of a

distinguished family, and was, on the mother's side, of Danish ancestry. He was educated at Lausanne, Leipsic and Berlin, studied law and served in the Franco-German war, where he rose to the grade of lieutenant. After filling the posts of secretary of legation at Rome, St. Petersburg, and Vienna, he became chargé d'affaires at Athens during the Russo-Turkish war, and later was secretary of the Berlin Congress. In 1888 he was appointed minister to Rumania, and in 1893 ambassador to Italy. He was called home to become minister of foreign affairs. His skilful treatment of the Samoan difficulty won him popular favor in his own country. During the Chinese complications in 1900 he fully supported the emperor's foreign policy. When Prince Hohenlohe resigned, 16 Oct. 1900, Von Bülow was called to succeed him as chancellor of the empire.

Bülow, Bertha von, bār'ta fōn, German story writer: b. Warmbrunn, Silesia, 30 Sept. 1850. Among her stories which enjoy great popularity are 'Merry Tales' (1891); and 'Once in May and Other Stories' (1892). She has also written some good comedies, namely, 'Theory and Practice' (1890), and 'Two Peaceful Ones' (1892).

Bülow, Friedrich Wilhelm, frēd-rīh vīl'helm (COUNT VON DENNEWITZ), Prussian general: b. Falkenberg, 16 Feb. 1755; d. Königsberg, 25 Feb. 1816. In his 14th year he entered the Prussian army. In the war of 1806 he was a lieutenant-colonel at the siege of Thorn, and distinguished himself in various battles. In 1808 he was made major-general and general of brigade. When the war against France broke out in 1813 he fought the first successful battle at Möckern, 5 April; 2 May took Halle, and protected Berlin from the danger which threatened it, by his victory at Luckau 4 June. He saved Berlin a second time by the memorable victory of Grosbeeren, 23 August, and relieved the same city a third time by the great victory at Dennewitz. For this service the king made him one of the few grand knights of the Iron Cross, and after the end of the campaign bestowed on him the title Count Bülow of Dennewitz, and made the same hereditary in his family. At the storming of Leipsic, 19 October, he took an important part. At the opening of the campaign of 1815 he received the chief command of the fourth division of the army, with which he contributed so essentially to the victory of Waterloo, that the king gave him the command of the 15th regiment of the line, which was to bear in future the name of the Regiment of Bülow von Dennewitz.

Bülow, Hans Guido von, hānts gwē'dō fōn, German pianist and composer: b. Dresden, 8 Jan. 1830; d. Cairo, Egypt, 12 Feb. 1894. He studied the piano under Liszt, and made his first public appearance in 1852. In 1855 he became leading professor in the Conservatory at Berlin; in 1858 was appointed court pianist; and in 1867 he became musical director to the king of Bavaria. His compositions include overture and music to 'Julius Cæsar,' 'The Minstrel's Curse,' and 'Nirvana'; songs, choruses, and pianoforte pieces. He was considered one of the first of pianists and orchestral conductors. In 1875-6 he gave a series of concerts in the principal cities of the United States. His Letters appeared 1895-7.

Bülow, Heinrich (hīn'rīh) von, German military writer: b. Falkenberg, in Altmark, about 1757; d. Riga, Russia, 1807. He studied in the military academy at Berlin, and afterward entered the Prussian service. But he soon retired, and occupied himself with the study of Polybius, Tacitus, and J. J. Rousseau, and then served for a short period in the Netherlands. He afterward undertook to establish a theatre, but immediately abandoned his project, and visited the United States, whence he returned poor in purse but rich in experience, and became an author. His first work was on the 'Art of War,' in which he displayed uncommon talents. He wrote a book on 'Money,' translated the 'Travels of Mungo Park,' and published in 1801, his 'History of the Campaign of 1800.' In 1804 he wrote 'Lehrsätze des neuern Kriegeres' (Theory of Modern Warfare) and several other military works, among which is his 'Tactics of the Moderns as They Should Be.' In the former he points out the distinction between strategy and tactics, and makes the triangle the basis of all military operations. This principle of his was opposed by Jomini, and other French writers. His history of the war of 1805 occasioned his imprisonment in Prussia, at the request of the Russian and Austrian courts. He died in the prison of Riga. He was a follower of Swedenborg.

Bülow, Karl Eduard von, kārl ēd-wārd fōn, German author: b. Berg vor Eilenburg, Saxony, 17 Nov. 1803; d. Öttinghausen, 16 Sept. 1853. His literary fame rests mainly on his 'Book of Tales,' after ancient Italian, Spanish, French, English, Latin, and German originals (4 vols. 1834-6), which was followed by a supplementary volume. Of his own original compositions, the 'Springtide Wandering Among the Hartz Mountains' is one of the best. He wrote also the very interesting story of 'The Youth of a Poor Man of Toggenburg,' founded on the autobiography of Ulrich Bräker, a Swiss weaver. He published the original later.

Bülow, Margarete von, mar-ga-rā'ta fōn, German novelist: b. Berlin 1860; d. near there, 2 Jan. 1885. She wrote four volumes of stories, namely, 'Stories' (1885); 'Jonas Briccius' (1886); 'Chronicle of the Riffelshausen Folks' (1887); 'New Stories' (1890). She delineated character with great precision, and displayed true insight into the human heart. She lost her life in an attempt to rescue a boy from drowning.

Buloz, François, frān-swā bū-lō, French publicist: b. Bubbens, Savoy, 20 Sept. 1803; d. Paris, 12 Jan. 1877. In 1831 he became editor of the 'Revue des Deux Mondes,' the celebrated French fortnightly literary magazine. From 1835-45 he also edited the 'Revue de Paris.' For 10 years (1838-48) he was director of the Comédie Française.

Bulrampur, bool-rūm-poor', a town of India, in the Fyzabad division of Oudh, the residence of the Maharaja of Bulrampur. It has a trade in rice, etc., besides manufactures of cotton and other articles.

Bulrush, a popular name for tall, reed-like plants which grow in marshy places, and which for the most part belong to the genus *Scirpus*. The common bulrush is frequent in clear waters and about the borders of rivers throughout Europe, as well as in North America and New

BULTHAUP—BULWER-LYTTON

South Wales. The roots are thick and stout, creeping under water in the deep mud; the stems are of a dark-green color, and four or five feet or more in height, and are naked, smooth, round, tough, pliant, and spongy within. Their base is covered with several sheathing scales, partly ending in leafy points. They are useful for packing and thatching, and especially for plaiting into the bottom of chairs.

Bulthaupt, Heinrich Alfred, hīn'rih āl-frēd boolt'haupt, German poet and dramatist: b. Bremen, 26 Oct. 1849. On quitting the university he was for a while a private tutor; then traveled in the East, Greece, and in Italy. He was a lawyer in his native town for some years, and in 1879 became custodian of the city library. Of his dramatic compositions the list is very long, comprising tragedies, 'Saul'; 'A Corsican Tragedy'; plays dealing with the questions of the time, 'The Workman'; comedies, comic operas, etc. He has also written 'Dramaturgy of the Theatre'; 'Dramaturgie der Klassiker,' a work of exceeding value; and 'Dramaturgie des Schauspiels'; also 'Dramaturgy of the Opera' (2 vols.).

Buluwayo. See **BULAWAYO**.

Bulwer, John, English physician. He flourished in the 17th century and appears to be entitled to the honor of having first pointed out a method of instructing the deaf and dumb. His works include 'Philocophus, or the Deafe and Dumbe Man's Friend' (1648); 'Chironomia, or the Art of Manual Rhetoric'; 'Chirologia, or the Natural Language of the Hand,' and 'Anthropometamorphosis.'

Bulwer, William Henry Lytton Earle (BARON DALLING AND BULWER), English author and diplomatist, brother of Sir Edward Bulwer-Lytton (q.v.): b. London, 13 Feb. 1801; d. Naples, 23 May 1872. He was minister to Madrid in 1843; in 1849 had a diplomatic mission to Washington, and was one of the negotiators of the Bulwer-Clayton Treaty (q.v.); was ambassador to Turkey in 1858-65. He was created Baron Dalling and Bulwer in 1871. His works include 'An Autumn in Greece' (1826); 'France, Social, Literary, and Political' (1834-6) 'Life of Byron' (1835); 'Historical Characters' (1868-70); 'Life of Palmerston' (1870-4).

Bulwer-Clayton Treaty, a treaty negotiated at Washington, D. C., in April 1850, by John M. Clayton, secretary of state under President Taylor, and Sir Henry Bulwer, British minister to the United States. It provided that neither the United States nor Great Britain should attempt to control a proposed canal across Nicaragua. The treaty provided further for the neutrality of the canal and it guaranteed encouragement to all lines of interoceanic communication. The terms of the treaty were afterward much disputed. In 1882 the United States government intimated to Great Britain that the canal having become impracticable because of reasons for which Great Britain alone was responsible, the United States considered the treaty as no longer binding, but Great Britain continued to hold it as in force. On 3 March 1890, Congress passed a bill providing for the construction of a canal on the Nicaragua route, which also authorized the President to open negotiations with Great Britain for the abroga-

tion of the Bulwer-Clayton Treaty, and under the last clause a convention between the two countries, abrogating the portions of the treaty that were deemed to be against the interests of the United States was signed in Washington, 5 Feb. 1900. See **TREATIES**.

Bulwer-Lytton, Edward George Earle (first LORD LYTTON), English politician and novelist: b. London 25 May 1803; d. Torquay, Devonshire 18 Jan. 1873. The Bulwers, long settled at Heydon Hall, Norfolk, claimed descent from the Normans and Vikings, perhaps as a ready explanation of their bold and turbulent spirit. The novelist's father, William Earle Bulwer, was colonel of the 106th regiment or Norfolk rangers. His mother, Elizabeth Barbara, was the only daughter of Richard Warburton Lytton of Knebworth in Hertfordshire, the family seat since the time of Henry VII. From her and her father, who was a learned scholar, Bulwer claimed to have derived his love for letters. As a boy he lived much among his grandfather's books and read through three circulating libraries. He wrote volumes of Byronic verse, some of which was published at the age of seventeen. Prepared for the university at various private schools, he entered Trinity College, Cambridge, at Easter in 1822; but soon migrated to Trinity Hall, where it was not necessary to attend lectures. At Cambridge he was a conspicuous member of the Union; he won the Chancellor's medal in 1825, and sketched two novels. At this time he also read enormously in history and began the practice of keeping those huge commonplace books which afterwards became useful in preparing his historical novels. Before receiving his bachelor's degree in 1826, he published more Byronic verse, fell desperately in love, made a tour of Scotland and the English lakes, and passed a season in Paris, where he was received into the most brilliant salons. Returning to London "a finished dandy," he married on 29 Aug., 1827, Rosina Doyle Wheeler, a beautiful Irish girl of some accomplishments. The marriage led to an estrangement from his mother and the young man was consequently thrown upon his own resources. He settled with his wife at Woodcot House in Berkshire, where he attempted to live in style from what he could earn with his pen. The marriage proving uncomfortable, a legal separation was obtained in 1836 after years of a life apart. On the death of his mother in 1843 he inherited Knebworth and assumed the surname of Lytton.

To pass by Bulwer's numerous contributions to annuals and periodicals, he published in 1827, 'Falkland,' a sentimental novel in imitation of Rousseau's 'Nouvelle Héloïse.' After a quick passage through the sentimental stage, he came out with 'Pelham' in 1828, a brilliant novel founded upon what he had seen of high life in London and Paris. It was likewise Bulwer's first excursion into politics and crime. Late in the same year followed 'The Disowned,' a curious novel which the author called "metaphysical" inasmuch as the characters are intended to stand for "certain dispositions influential upon conduct." After 'Devereux' (1829), an experiment in historical romance, Bulwer took up the criminal novel, publishing 'Paul Clifford' (1830) and 'Eugene Aram'

(1832), which are among his most characteristic books. By this time a popular novelist, he displayed during the coming years extraordinary versatility. With 'The Pilgrims of the Rhine' (1834) he began a series of fantastic tales which he called ideal and poetic, announcing that they should be judged "by the rules rather of poetry than prose." The chapter entitled "The Life of Dreams" elaborates a clever system of dreaming, evidently made use of in our day by Du Maurier in 'Peter Ibbetson' and by Kipling in 'The Brushwood Boy.' Occult philosophy was cleverly employed in 'Zanoni' (1842) and speculation about the future age of electricity in 'The Coming Race' (1871). A series of ghost stories culminated in 'The Haunted and the Haunters' (1861) hardly surpassed in its kind. Historical romance, resumed in 'The Last Days of Pompeii' (1834), was continued in 'Rienzi' (1835), 'The Last of the Barons' (1843), 'Harold' (1848), and the incomplete 'Pausanias' (posthumous, 1876). The best of these novels stand for an attempt to get near to the facts of history. In the midst of this work was planned a comprehensive history of 'Athens, its Rise and Fall,' of which two volumes appeared in 1837. Another idealization of the criminal in 'Lucretia' (1847) provoked considerable criticism, to which he replied with 'A Word to the Public' (1846). To test his popularity, Bulwer now published anonymously in *Blackwood's Magazine* three experiments in 18th century humor. The series comprises 'The Caxtons' (1849), 'My Novel' (1853), and 'What Will He Do With It' (1858). Though a little too obviously in the manner of Sterne, the novels are among Bulwer's best work. They were, curiously enough, as well received by the public as if they had borne the author's name. Somewhat like them is 'Kenelm Chillingly' (1873), interesting besides for its infusion of autobiography.

Throughout his career, Bulwer never ceased to cultivate his muse. From the Byronic influence that marked his poems down to 1830, he worked into satire, addressing himself "to the humors rather than to the passions of men." The 'Siamese Twins' (1831) a poem of four books in the metre of 'Hudibras' appeared in a volume of miscellaneous poems, of which the longest is one on Milton. 'The New Timon; A Poetical Romance of London' (1846), a satire on men then prominent in politics and literature, is memorable for the reference to Tennyson as "Schoolmiss Alfred," and for Tennyson's caustic stanzas in a reply contributed to *Punch*, 28 Feb. 1846. Among Bulwer's other collections of verse are 'Poems and Ballads,' translated from Schiller (1844); an epic in two volumes on 'King Arthur' (1848-9); 'The Lost Tales of Miletus' (1866); and a translation of the 'Odes and Epodes of Horace' (1869). If Bulwer did not gain much fame as a poet, he exactly hit popular taste in three plays—'The Lady of Lyons' (1838), 'Riche-lieu' (1838) and 'Money' (1840)—which still keep the stage.

Bulwer's rôle in letters has obscured for later times the part he played in politics. From 1831 to 1841 he sat in parliament as a liberal member for St. Ives, Huntingdonshire, and then for Lincoln. After making his maiden speech in support of the Reform Bill, he de-

voted his energies largely in favor of copyright on original works, cheap postage on newspapers, and the laws affecting dramatic literature and the stage. His early speeches on these subjects are still worth reading. In 1834, he issued a spirited pamphlet on the 'Present Crisis,' which went through 20 editions and influenced greatly the election that brought Lord Melbourne back to power. The new premier offered him a lordship in the admiralty but the post was declined. In 1841, Bulwer lost his seat owing to his willingness to accept a slight tax on corn. Ten years later he advocated protection to this extent in 'Letters to John Bull, Esq.'; and in 1852 he returned to parliament as a conservative member for Hertfordshire. His numerous speeches of this period relate to the excise duties, the Crimean War, China, and the East India Company. On the formation of the Derby Ministry in 1848, he became secretary to the colonies. While holding this office he organized the new colony of British Columbia. He spoke in support of Disraeli's reform bill of 1859 but against the measures introduced by Lord Russell and Gladstone in 1860 and 1866. As a reward for his services, he was elevated to the peerage in 1866, as Baron Lytton of Knebworth. Before this he received the degree LL.D. from both of the great English Universities. In 1854 he was installed honorary president of the associated societies of Edinburgh University, and he was twice elected lord rector of the University of Glasgow. To the last he kept up his literary work. 'The Parisians' was running in *Blackwood's Magazine* when the end came at Torquay on 18 Jan. 1873.

As a novelist Bulwer was subjected to fierce assaults from the critics throughout his career. Thackeray, for example, in a review of 'Ernest Maltravers' ridiculed and scorned his bad art, affected style, "his eternal whine * * * about the good and the beautiful" and "the dulness of his moral sense." Still there is the other side. In various prefaces to his novels and especially in two papers contributed to the *Monthly Chronicle* for 1838, Bulwer carefully elaborated his views on the art of fiction, drawing clear distinctions between the novel and the drama as he understood and practiced them. He never aimed at the dramatic novel wherein each incident and conversation must contribute to the working out of a logical plot. "It is often desirable," he said with reference to the novel, "to go back instead of forward,—to wind, to vary, to shift the interest from person to person" that the reader may not become fatigued. In that aim he succeeded. However much his novels may fail in technical details, they have never failed to find an audience.

Bibliography.—Unfortunately there is no adequate life of Bulwer or critical edition of his novels, indicating the many important changes he made in the text from time to time. Uncritical editions of the novels are numerous. To his 'Speeches' (two vols., Edinburgh 1874), his son, the Earl of Lytton, prefixed a memoir dealing with his political career. The period of his life from 1803 to 1832 is covered by a most interesting autobiography, half fact and half fiction, and several supplementary chapters by his son, published together under the title 'Life, Letters, and Literary Remains' (2 vols.,

London 1883). After the death of Lady Lytton, her executrix, Louisa Devey, published in vindication of her memory 'Letters of the Late Edward Bulwer, Lord Lytton to his Wife' (New York 1889). WILBUR L. CROSS, Professor of English, Yale University.

Bulwer-Lytton, Edward Robert. See LYTON, EDWARD ROBERT BULWER.

Bum-boat (perhaps originally "boom-boat," from the boom rigged out from the side of a man-of-war at anchor, to which boats may make fast), employed by hucksters to visit ships lying at anchor, with supplies of provisions, trinkets, clothing, etc., for sale to the sailors.

Bumblebee, a wild bee of some species of the genus *Bombus*, of which upward of 50 species inhabit North America. Few occur in the southern hemisphere or tropical regions, and none in Africa south of the Sahara or in Australia, while they are the only bees inhabiting Arctic and Alpine regions. The bumble, or humble, bee is recognized by its large, thick, hairy body and long bass hum. The colonies of bumblebees are not numerous compared with those of wasps, or the stingless or the honey bee. A populous colony in England and America may number from 300 to 400 individuals. The proportion of sexes and castes of *Bombus muscorum* in England were found by Smith to be, in a colony of 120, 25 females, 36 males, and 59 workers. The roundish oval cells differ in size and have no exact arrangement. Besides the cells containing the young, the old discarded ones are made to serve as honey tubs or pollen tubs, and there are also the cells of the guest or Psithyrus bees (q.v.). In good weather and when flowers are plentiful the bees collect and store honey in abundance, and when the empty pupa-cells are full they form special cells made entirely of wax and these are filled with honey, and left open for the benefit of the community (Sharp). Hofer states that special tubs for the storing of pollen are sometimes constructed. Putnam says that the larvæ make their own cells of silk, which are finally strengthened with wax by the old bees. Bumblebees have been seen working in warm moonlight nights. About two centuries ago Godart stated that a trumpeter bee is kept in some nests to rouse the colony to work by three or four o'clock in the morning, and this has been recently confirmed by Hofer, who observed the fact in his laboratory. If the trumpeter was removed its place was filled the next morning.

There is a great deal of variation in our bumblebees, and, besides the local and climatic varieties, polymorphism is apparently marked, as Packard has (in *Bombus fervidus*) detected two sets of males and females, the large and the small; but whether there are two sizes of workers has not yet been ascertained.

The queen bees lay their eggs in masses of bee-bread attached to the top or sides of the old cells, in little enclosures formed by thin partitions set up by the bee after the eggs have been deposited. Thus placed, says Packard, in a mass of food, the young larvæ, on hatching, begin, by eating the food, gradually to construct their cells in the manner described by Putnam, who gives the following account of the economy of the bumblebee colony:

The queen awakens in early spring from her winter's sleep beneath the leaves or moss, or in deserted nests, and selects a nesting-place, generally in an abandoned nest of a field-mouse, or beneath a stump or sod, and immediately collects a small amount of pollen mixed with honey, and in this deposits from seven to fourteen eggs, gradually adding to the pollen mass until the first brood is hatched. She does not wait, however, for one brood to be hatched before laying the eggs of another; but, as soon as food enough has been collected, she lays the eggs for the second.

As soon as the larvæ are capable of motion, and commence feeding, they eat the pollen by which they are surrounded, and gradually separating, push their way in various directions. Eating as they move, and increasing in size quite rapidly, they soon make large cavities in the pollen mass. When they have attained their full size, they spin a silken wall about them, which is strengthened by the old bees covering it with a thin layer of wax, which soon becomes hard and tough, thus forming a cell. The larvæ now gradually attain the pupa stage, and remain inactive until their full development. They then cut their way out, and are ready to assume their duties as workers, small females, males, or queens.

It is apparent that the irregular disposition of the cells is due to their being constructed so peculiarly by the larvæ. After the first brood, composed of workers, has come forth, the queen bee devotes her time principally to her duties at home, the workers supplying the colony with honey and pollen. As the queen continues prolific, more workers are added, and the nest is rapidly enlarged. About the middle of summer eggs are deposited which produce both small females and males. All eggs laid after the last of July produce the large females or queens; and, the males being still in the nest, it is presumed that the queens are impregnated at this time, as, on the approach of cold weather, all except the queens, of which there are several in each nest, die.

Consult. Putnam, 'Notes on the Habits of Some Species of Humblebees'; and Packard, 'The Humblebees of New England and Their Parasites' (Proceedings Essex Institute, IV.); Sharp, 'Insects,' Part II.

Bum'blefoot, a corn or abscess on the feet of domestic fowls, thought to arise from roosting on narrow perches or walking on sharp pebbles. The disease is sometimes incurable, but in other cases yields to the daily application of lunar caustic.

Bumblepuppy, a coined word used to describe the attempts of unskilful persons to play whist; opposed to scientific whist and "the rigor of the game."

Bummalo'ti, a fish (*Harpodon nehereus*), related to the salmon, but marine, which is caught in large quantities on the western coast of India, dried, salted, and exported all over the East. A trade-name is "Bombay duck."

Bump'ing Posts, constructions at the ends of railroad tracks in shifting yards, intended to prevent cars from running off the track. They are usually strong wooden frames with buffers placed at such a height as to receive the blow of the platform or coupler of the car. Banks of earth or cinders are sometimes utilized

BUMPO — BUNDI

for this purpose and portable metal posts known as shipblocks are frequently employed as bumping posts.

Bumpo, Natty. See **LEATHERSTOCKING**.

Bump'us, Herman Carey, American educator: b. Buckfield, Maine, 5 May 1862. He was graduated from Brown University in 1884, was professor of biology at Olivet College, Mich., 1886-9; professor of zoology in Clark University, Worcester, Mass., 1890-1; and professor of comparative anatomy in Brown University from 1892. In 1898 he was appointed director of the biological laboratory of the United States Fish Commission at Wood's Hole, Mass. He is the author of 'A Laboratory Course in Invertebrate Zoology' (1893).

Bunce, Francis Marvin, American naval officer: b. Hartford, Conn., 25 Dec. 1836; d. there, 19 Oct. 1901. He entered the naval service in 1851, and was graduated from the naval academy in 1857. In 1862 as executive officer of the *Penobscot* he took part in the engagement with the rebel batteries at Yorktown, Va. Assigned to temporary duty with the army, he had charge of the disembarkation of the heavy artillery and mortars for use in the investment of Yorktown by Gen. McCellan, April 1862. He commanded a successful expedition up Little River, between North and South Carolina, destroying several schooners and large quantities of cotton, turpentine, and resin, together with extensive salt works. With the monitor *Patapsco* in 1863 he took part in all the actions in which she was engaged during the siege of Charleston, and was wounded by the premature explosion of a cartridge. Later he was chief of scouts on the staff of Admiral Dahlgren. On 5 Sept. 1865 he was placed in command of the monitor *Monadnock*, and took that vessel from Philadelphia to San Francisco, the first extended sea voyage ever made by a monitor. On 1 March 1895 he was selected to command the North Atlantic squadron, with the rank of active rear-admiral. On 1 May 1897 he went to the Brooklyn navy yard and there superintended the conversion of many fast ships and yachts for war service. It is said that the government's policy of furnishing the navy with abundant ammunition for target practice and giving prizes for the best shots, a policy which produced such admirable results in the Spanish-American war, was due to the efforts of Admiral Bunce. He was commissioned rear-admiral 6 Feb. 1898, and retired from active service 25 Dec. 1898.

Bunce, Oliver Bell, American author: b. New York, 8 Feb. 1828; d. there, 15 May 1890. After spending several years as clerk in a stationery store, and bookseller and publisher on his own account, he became manager of the publishing house of James G. Gregory, which he conducted very successfully for many years. It was at his instigation that the fine edition of Cooper's works, with steel and wood engravings by F. O. C. Darley, was planned and published. For a short time he was a reader for Harper & Bros., but in 1869 he formed a connection with D. Appleton & Company, that ended only with his death. He edited 'Appleton's Journal,' and largely planned and carried through for the firm some of their most famous illustrated publications, such as 'Picturesque America,' 'Picturesque Europe,' 'Picturesque

Palestine.' In addition to office business his literary aptitudes and ambitions kept him at work in spite of chronic invalidism. He wrote among other works, 'Romance of the Revolution' (1852); 'A Bachelor's Story' (1859); 'Life Before Him' (1860); 'Bachelor Bluff, His Opinions, etc.' (1881); 'Don't: A Manual of Mistakes and Improprieties' (1883), of which over 100,000 copies have been sold; 'My House: An Ideal' (1884), a graphic study of a country home; and 'The Adventures of Timias Terry-stone: a Novel' (1885). As a very young man he wrote three plays which were accepted and produced on the stage with success: 'Fate, or the Prophecy,' a tragedy; 'Love in '76,' a comedy; 'Marco Bozzaris,' an heroic tragedy. The second of these was played by Laura Keane, the other two by James W. Wallack.

Bun'co, a familiar term applied to the practices of a certain class of swindlers. The trickster trades upon the credulity of an apparently well-to-do stranger in the city, under pretense of some connection with the latter's friends or native place, or by similar expedients. After confidence is secured, counterfeit money is imposed upon him, he is induced to cash "bogus" checks, etc., or even becomes the victim of more direct robbery.

Buncombe, swollen political oratory not directed to the point in hand or the audience present, but to the achievement of a charlatanic reputation outside. "Twisting the tail of the British lion," and other like feats of windy chauvinism, are specimens of buncombe; the object of the speaker being, not primarily to impress the hearers, but to make the general populace admire his swaggering patriotism. The reputed origin of the story is an anecdote of a member of the North Carolina legislature, from Buncombe County in that State, who told the thin remnants of a house he had nearly emptied by his dull and pointless remarks, that they might go, too, as he was only "speaking for Buncombe." Wheeler, 'History of North Carolina.'

Bundelcund, būn-dēl-kūnd', or **Bandal-khand**, būn-dēl-kānd', India, a tract, consisting partly of certain British districts connected with the Northwest Provinces, and partly of a number of small native states subordinate to the central India agency. Its surface is considerably diversified, and there are several ranges of hills, some of which reach the height of 2,000 feet. It has soil of every variety, which yields almost every grain and plant of India. Its waters are carried by different streams to the Jamna, and so to the Ganges. The total area is 20,559 square miles, of which the British districts occupy 10,332. Population of the latter about 1,400,000.

Bundesrath, boon-déz-rät, the German federal council which represents the individual states of the empire, as the Reichstag represents the German nation. It consists (1900) of 58 members, and its functions are mainly those of a confirming body, although it has the privilege of rejecting measures passed by the Reichstag.

Bundi, boon'de, India, a principality in Rajputana, under British protection; area, 2,300 square miles. Although small, Boondee is important as the medium of communication be-

BUNGALOW — BUNNING

tween the north and south. Pop. 295,675. **Bundi**, the capital, is picturesquely situated, and its antiquity, numerous temples, and magnificent fountains give it a very interesting appearance. Pop. 22,544.

Bun'galow, an East Indian term for a kind of country house with a thatched or tiled roof. Bungalows are generally of one story, though sometimes of two, and have verandas running round them to afford shelter from the sun. Public bungalows for travelers (daks) are maintained by government on the main highways.

Bun'gay, England, a market town in Suffolk, on the right bank of the Waveney, 30 miles northeast of Ipswich. It is well built; the streets, spacious and well paved, diverging from a moderate-sized area in the centre of the town, forming a market-place, in which is a handsome cross. It has two fine churches. The principal trade is in corn, coal, flour, lime, and malt, in which a considerable amount of business is done. There is also an extensive printing-office and stereotype foundry. Adjoining the town is a very spacious common. Pop. about 4,000.

Bunge, boon'gè, **Alexander**, Russian botanist: b. Kiev, 24 Sept. 1803; d. 1890. He was educated at Dorpat, and after taking the degree of M.D. in 1825 he traveled in Siberia and the eastern part of the Altai Mountains, and then joined the mission of the Academy of St. Petersburg to Peking, where he remained eight months and procured an extensive herbarium. In 1833, by invitation of the Academy of St. Petersburg, he made a second Asiatic journey, and in 1836 settled as professor of botany at Dorpat. His principal publications are catalogues of the plants which he collected in China and near the Altai Mountains.

Bunge, Frederic George, Russian jurist: b. Kiev (brother of the preceding), 1 March 1802; d. 1897. He was educated at Dorpat, and for many years was professor of law there. His writings, principally upon the history of law and rights in the countries around the Baltic Sea, are numerous and valuable.

Bungert, August, ow'goost boon'gärt, German composer: b. Mülheim, Prussia, 14 March 1846. He studied under Kufferath at Mülheim, at Cologne, and Paris. He held a position as musical director at Kreuznach, then went to Berlin, where he continued his studies under Kiel, and later moved to Genoa. His compositions include an opera cycle, 'The Homeric World,' consisting of two main parts, 'The Iliad,' and 'The Odyssey'; 'Tasso'; 'The Students of Salamanca,' a comic opera; 'On the Wartburg'; and a number of songs. The songs are considered his most successful productions.

Bu'nias, a small genus of plants of the natural order *Cruciferae*, mostly natives of south-eastern Europe and adjacent Asia. Some of the species, especially *B. orientalis*, called hill-mustard, have been cultivated for forage, and have become weeds where they have escaped from cultivation. Since they are not very leafy and are not relished by stock, they have not become popular.

Bunion, a small, hard, painful tumor, formed in any part of the foot, but especially in the metatarsal joints. It consists in a swelling of the bones themselves, which fact distin-

guishes bunions from corns. It appears to be caused by the pressure of a boot or shoe which is too tight, especially when the feet are a little deformed. The best means to relieve the pain is to remove the causes of the tumor as soon as possible, to give rest to the foot, and to apply lotions and emollient poultices.

Bunker Hill, Mass., an eminence, 110 feet high, in the Charlestown district of Boston, connected by a ridge with another elevation, 75 feet high, named Breed's Hill. These heights are memorable as being the scene of a battle, 17 June 1775, commonly known as the battle of Bunker Hill. The city of Boston was occupied by the British under Gen. Gage, who had resolved to begin offensive operations against the rebels. This design becoming known in the American camp, it was determined to seize and fortify the heights of Charlestown on the night of 16 June. The execution of this perilous mission was confided to Cols. Prescott and Pepperell at the head of a brigade of 1,000 men; and at dawn of day a strong redoubt was already completed on Breed's Hill. About 1,500 Americans advanced successively to the relief of Prescott, and Gen. Warren entered the redoubt as a volunteer, refusing the command which was tendered to him. At about two thirty o'clock, two columns of the British advanced to a simultaneous assault; they were received with a terrific fire, and were twice repulsed in disorder. When the Americans had exhausted all their ammunition, Prescott gave the order for retreat. They received a destructive volley as they left the redoubt, and Warren fell, shot through the head with a bullet. The retreat was harassed by a raking fire from the British ships and batteries, but there was no pursuit beyond Charlestown Neck. The British loss was 226 officers and men killed, and 828 wounded; that of the Americans 145 killed or missing, and 304 wounded. Although a defeat, the moral result of this action was great. The Americans had seen superior numbers of the disciplined soldiers of England retreat before their fire, and had given the proof that they were able to defend their liberties. On Breed's Hill, and near the spot where Warren fell, stands the Bunker Hill Monument, the corner-stone of which was laid by the Marquis de Lafayette, 17 June 1825. This monument was inaugurated 17 June 1843. It consists of a plain granite shaft, 220 feet high, 31 feet square at the base, and 15 at the top. The monument affords a magnificent panoramic view of the surrounding country.

Bunner, Henry Cuyler, American author: b. Oswego, N. Y., 3 Aug. 1855; d. Nutley, N. J., 11 May 1896. He became a journalist in 1873, and was editor of 'Puck' from shortly after its start till his death. He was author of 'A Woman of Honor' (1883); 'Airs from Arcady and Elsewhere' (1884); 'The Midge' (1886); 'The Story of a New York House' (1887); 'Zadoc Pine and Other Stories' (1891); 'Short Sixes' (1891); 'The Runaway Browns' (1892); 'Jersey Street and Jersey Lane' (1896).

Bun'ning, Herbert, English composer: b. London, 2 May 1863. He graduated from Brasenose College, Oxford, and was for a time lieutenant in the 4th Hussars, but resigned his commission to study music in France and Italy. He remained abroad four years (1886-90), and after his return to England was musical director

BUNODONT — BUNSEN

in the Lyric Theatre, 1892-3, and in the Prince of Wales Theatre, 1895-6. Among his musical compositions are 'Shepherd's Call'; 'Village Suite'; and 'La Princesse Osra,' an opera produced at the Royal Opera, Covent Garden, in July 1902.

Bun'odont, a term applied to animals in which the crowns of the molar teeth are composed of a number of low rounded cones or eusps. The pig is one of the best examples among living animals; the teeth of monkeys and other omnivorous or frugivorous animals, including man, are also of this type. It is probable that the molars of many if not all modern mammals have been evolved from bunodont teeth, for the ancestors of many races of the modern hoofed animals, carnivora, and some other groups, show a series of stages in the evolution of the teeth leading from the omnivorous bunodont type into the specialized grinding or cutting teeth (selenodont) of the modern animals. See **TEETH**.

Bun'sen, Christian Karl Josias (CHEVALIER), German statesman and philosopher: b. Korbach, Waldeck, 25 Aug. 1791; d. Bonn, 28 Nov. 1860. He studied philology under Heyne at Göttingen, and subsequently went to Holland and Denmark, to acquire a critical knowledge of the Danish and Dutch languages. In 1815 he made the acquaintance at Berlin of the celebrated Niebuhr, and in 1816 proceeded to Paris, where he studied Persian and Arabic under Sylvestre de Sacy. The same year he visited Rome, where he married, and renewed his intimacy with Niebuhr, then Prussian ambassador at the papal court. Niebuhr procured him the appointment of secretary to the Prussian legation, and in 1823 Bunsen assumed Niebuhr's duties, being later, and in 1827, formally accredited as resident Prussian minister. In this capacity he continued till 1838, and conducted several important negotiations with the papal see, the result of one of which was the brief of Leo XII. relative to mixed marriages. His next mission was to Berne, as ambassador to the Swiss Federation. During his residence at Rome Bunsen had industriously pursued his philosophical and historical studies, including more especially that of the Platonic philosophy, and investigations into the religious and ecclesiastical history of mankind. The liturgies of the Church received his especial attention, and a service of his own framing, introduced by him into the chapel of the Prussian embassy at Rome, was printed by order of the king of Prussia, who wrote a preface to it. This work was published without the author's name at Hamburg in 1846, under the title of 'Allgemeines Evang. Gesang-und Gebetbuch' ('General Hymn and Prayer Book of the Evangelical Lutheran Church'), and may be regarded as a new edition of the 'Versuch Eines Allgemeinen Evang. Gesang-und Gebetbuches,' published at Hamburg in 1833.

In 1841 Bunsen was summoned to Berlin from Switzerland to proceed to England in charge of a mission for the establishment, in conjunction with that country, of a bishopric at Jerusalem. Shortly afterward he was nominated Prussian ambassador to England. In 1844 he was consulted on the subject of granting a constitution to Prussia, and is said to have drawn

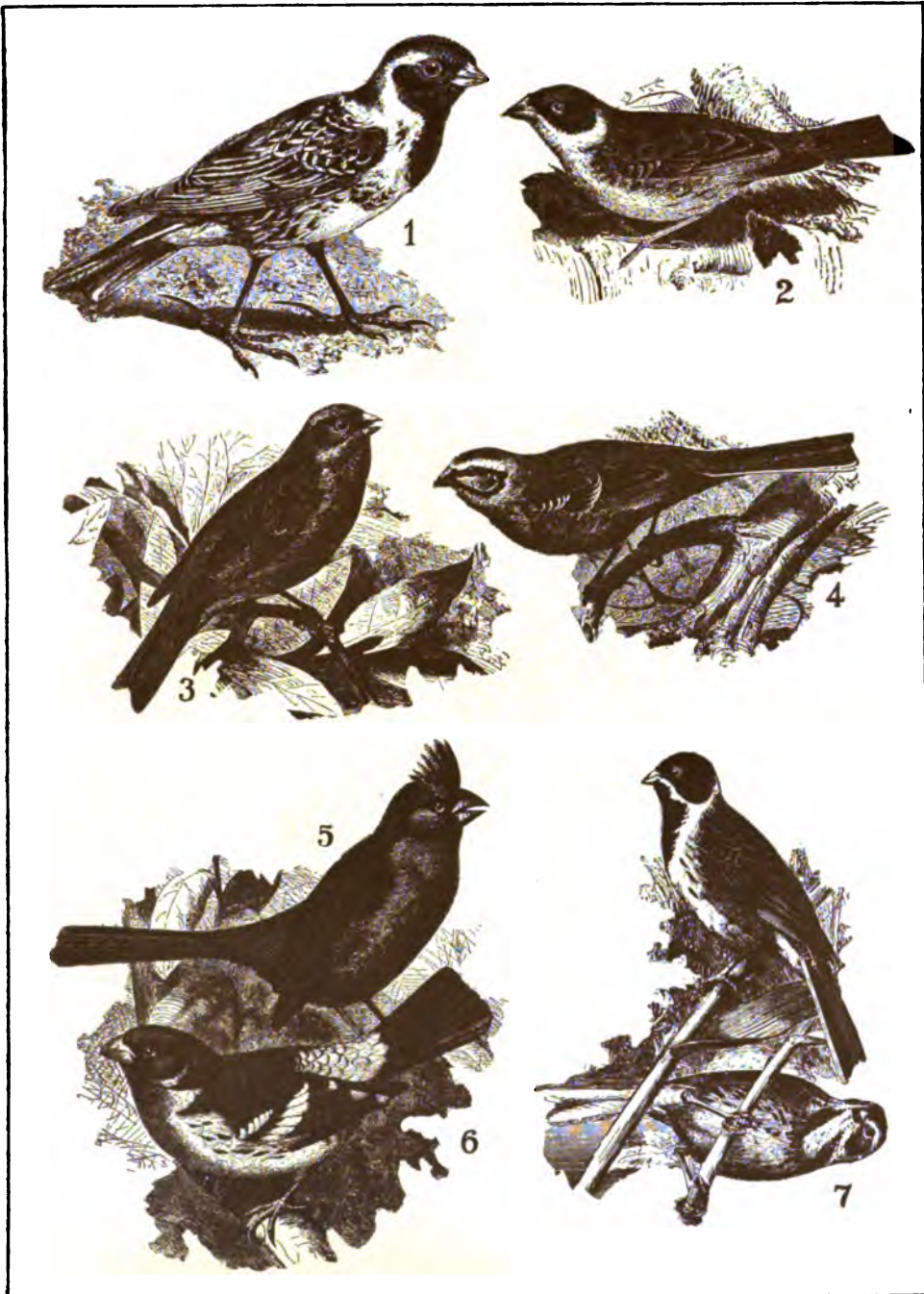
up and submitted to government the form of one which bore a very close resemblance to that of Great Britain. In the Schleswig-Holstein affair he strenuously supported the claims of Prussia and the German Confederation in opposition to those of Denmark. From the opposite views taken by him to those of his government in relation to the Russian war he was recalled from London in 1854, and, abandoning politics, retired to Heidelberg to devote himself exclusively to literary pursuits. The results of these have established his reputation as one of the most profound and original critics in the department of biblical and ecclesiastical history. Among these are 'Die Verfassung der Kirche der Zukunft' ('The Constitution of the Church of the Future') (1845); 'Ägyptens Stelle in der Weltgeschichte' ('Egypt's Place in the World's History') (1845); 'Hippolytus und Seine Zeit' ('Hippolytus and His Time') (1851); and lastly, his greatest work, 'Bibelwerk für die Gemeinde' ('Bible Commentary for the Community'), the first part of which was published in 1858, and was intended to be completed in 1862. It had occupied his attention for nearly 30 years, and, as he informs us, was regarded as the grand centre-point to which all his literary and intellectual energies were to be devoted. Death interposed to prevent him completing his undertaking. Ill health caused him to spend the winters of 1858-9 and 1859-60 at Cannes, in the south of France, returning thence in the spring of 1860 to Bonn (whither he had recently transferred his abode from Heidelberg), where he died. Three volumes of his 'Bibelwerk' had been published at his death (the first, second, and fifth), and this great work was completed in his spirit and by the aid of his manuscripts under the editorship of Holtzmann and Kamphausen, in nine volumes (1858-70).

Bunsen, Robert Wilhelm Eberard, German chemist: b. Göttingen, 31 March 1811; d. 16 Aug. 1899. He studied at Göttingen University, and at Paris, Berlin, and Vienna; was appointed professor at the Polytechnic Institute of Cassel 1836; extraordinary professor at the University of Marburg 1838, and ordinary professor there 1841; professor at Breslau 1851; and finally professor of experimental chemistry at Heidelberg 1852. Among his many discoveries and inventions are the production of magnesium in quantities, magnesium light, spectrum analysis, and the electric pile and the burner which bear his name (see below). Among his works are 'Chemische Analyse durch Spektralbeobachtungen' (with Kirchhoff, 1861; new ed. 1895); 'Gasometrische Methoden' (1857; English by Roscoe); and 'Anleitung zur Analyse der Aschen und Mineralwasser' (1874). He retired from active teaching in 1889.

Bunsen Battery, a modification of the Grove battery, plates or bars of gas coke being used instead of platinum. The electromotive force is slightly less than that of the Grove battery.

Bunsen Burner, a form of gas-burner especially adapted for heating, consisting of a tube in which, by means of holes in the side, the gas becomes mixed with air before consumption, so that it gives a non-illuminating, smokeless flame. Burners of this nature are part of the indispensable outfit of a chemical laboratory.

BUNTINGS, CANARIES, ETC.



1. Lapland Longspur Bunting.

2. Chaffinch.

3. Wild Canary.

4. Meadow Bunting.

5. Cardinal.

6. Rose-breasted Grosbeak (Male). ☐.

7. Reed Bunting (Male and Female)

BUNT — BUNYAN

Bunt, sometimes called **Smut Ball**, **Pepper Brand**, and **Brand Bladders**, the most formidable disease, perhaps, to which wheat is subject, but one which may in most instances be greatly modified, and which seldom in the present day does material injury, except where there is careless cultivation. Like many other of the diseases to which the cereal plants are subject, it arises from the attack of a parasitic fungus (*Uredo caries*). It is generated in the ovary of wheat and a few other *Gramineæ*, and very rarely on the stem. It is formed at an early stage of growth, before the ear is free from the sheath; and indeed the plants which are affected by the parasite may be readily recognized by their unusual luxuriance, being generally several inches higher than plants not affected, larger in bulk, and often producing a greater number of stems from the same root. The bunted grains are shorter and blunter than the sound, of a dark-green when young, but when old of a pale brown, or sometimes nearly black. The contents of the ovary are reduced to a uniform black powder or paste, which has an offensive smell like that of decayed fish. Various substances have been used by cultivators to prevent the growth of bunt, such as salt, quicklime, arsenic, corrosive sublimate, etc. Careful washing and a selection of good seed will alone prevent much mischief, but it is advisable to take some more stringent measures with a view to destroy the vitality of the bunt spores. For this purpose Dombasle's method is the most successful. It consists in thoroughly wetting the grain with a solution of sulphate of soda (Glauber's salts), then drying the wheat with quicklime, which combines with the water to make sulphate of lime (gypsum), which acts as a manure, while the caustic soda destroys the vegetative powers of the bunt spores.

Bunter Sandstone, one of the three great divisions of Triassic formation. It is the lowest, that is, the oldest, of the series. It corresponds to the *grès bigarré* (variegated freestone or grit) of the French. In the Hartz it is more than 1,000 feet thick; in Cheshire and Lancashire, England, about 600. The footprints formerly known as those of chirotherium, now known to be labyrinthodont, are found in the bunter; the plants are chiefly ferns, cycads, and conifers.

Bunting, Jabez, English clergyman: b. Monyash, Derbyshire, 1778; d. London, 16 June 1858. His parents were members of the Wesleyan Church and removed to Manchester when he was a child. While at school he attracted the attention of Dr. Percival, who employed him as his amanuensis, and at his death made him one of his executors. He early joined the Church; became a traveling preacher in 1799; joined the Conference after the death of Mr. Wesley, and was appointed to the Oldham circuit. After traveling four years he was sent to London, where he gained great popularity as a pulpit and platform orator. After remaining two years in London he was removed to Manchester, where he distinguished himself as an advocate of ecclesiastical order and discipline in a controversy with some disaffected Methodists. In this controversy he gave such evidence of a knowledge of the polity of Wesleyan Methodism as secured for him the favor of the entire body to which he belonged. He was four times presi-

dent of the Methodist Conference; 17 years missionary secretary; and three years as editor. In 1835 he was chosen president of the theological school, and was looked upon as the acknowledged leader of the Methodists, superintending the interests of the body at home and abroad, while, at the same time, his influence was felt in other evangelical denominations, and also in the political world, statesmen frequently resorting to him for advice. Yet he derived only the ordinary emoluments of a Methodist minister — a yearly salary of £150, with house-rent and taxes. During all the distractions connected with the secessions that have taken place in the Wesleyan body, Dr. Bunting remained a firm, unwavering adherent and advocate of the doctrines and discipline of the Church as they came from the hands of John Wesley, and to his influence and indefatigable zeal are largely to be ascribed the permanency and prosperity of the Wesleyan connection.

Bunting, one of a group of cone-billed birds, forming the genus *Emberiza*, represented in Europe by several large, brown-streaked, or yellowish finches, of which the corn-bunting, reed-bunting, and ciril-bunting (qq.v.) are well known in Great Britain. The corn-bunting, which is considerably larger than a house sparrow, is brown in color with darker streaks on the upper parts or whitish brown with dark brown spots and lines on the under parts, and has a slightly forked tail. The reed-bunting has a black head and throat and the nape and sides of the neck are white. The head of the ciril-bunting is olive-green, with bright yellow patches on the cheek and over the eyes. The term is used in the United States for two or three similar birds, such as the dick-cissel, and snow-bunting (qq.v.). All the buntings are good singers, and the term is applied by dealers in cage birds not only to the true European buntings, but to many other seed-eaters, such as the ortolan and our indigo-bird.

Bunting, a thin woolen stuff, of which flags are usually made; hence, flags, collectively.

Bun'ya-bun'ya, the native Australian name of the *Araucaria bidwillii*, a fine Queensland tree with cones larger than a man's head, containing seeds that are eagerly eaten by the natives.

Bunyan, John, English preacher and author: b. Elstow, near Bedford, Bedfordshire, England, 1628; d. Swan Hill, London, 31 Aug. 1688. The Bunyans were an old family in Bedfordshire but Bunyan's immediate ancestors for several generations had been obscure, and Bunyan's own father, Thomas Bunyan, was a tinker. Of his mother, Margaret Bentley, little is known. In spite of their lowliness, however, these parents trained Bunyan with some care and sent him to the Bedford schools. Then he took up the trade of tinker, at which, until he became an established preacher, he worked industriously. In the latter part of 1645 and the early months of the following year he fought in the Civil War, but on which side is uncertain. Froude maintains that he was in the Royalist army, whereas Macaulay and Brown, to whom the weight of authority must be given, state that the evidence goes to show that Bunyan was with the Parliamentarians. In 1646, he returned to his trade in Elstow, and at about

the age of twenty married a wife, whose goodness of character is the accepted proof that Bunyan was better than he represented himself.

Of far more importance in giving character to Bunyan's career was his spiritual life. Besides being brought up religiously and at a time of peculiarly strong belief in the literal truth of hell and heaven, of damnation and atonement, of devils and evil spirits, Bunyan's boyhood and early manhood were not only a continual struggle between the inclinations of an active, pleasure-loving youth and the terror lest he be doomed to eternal perdition, but also a spiritual anguish heightened by one of the most imaginative of minds of which there is record. "He was," says William James ('The Varieties of Religious Experience'), "a typical case of the psychopathic temperament, sensitive of conscience to a diseased degree, beset by doubts, fears, and insistent ideas, and a victim of verbal automatisms, both motor and sensory. These were usually texts of Scripture which, sometimes damnatory and sometimes favorable, would come in a half-hallucinatory form as if they were voices, and fasten on his mind and buffet it between them like a shuttlecock." Though in most ways a wholly respectable character, he speaks of himself, in his autobiography, 'Grace Abounding,' as a most blasphemous youth, in return for which he was warned and tormented by visions to which he gave little heed. When the visions left him he tells us that he became worse, nor were some narrow escapes from death sufficient to make him repent. His marriage had a good effect on him; he went to church regularly and was reverent, though, he says, in a formal way. He still liked his sports and was in the habit of playing cat on the village green Sunday afternoons. The effect of a peculiarly vivid vision of a warning voice from heaven while he was in the act of striking the cat, was to make him despair of ever being redeemed from his wicked courses. Yet he began to mend his ways, first giving up his profanity, then his love of bellingering, and lastly his dancing, though it took him "nearly a full year before he could quite leave that." He became esteemed as a godly man, but he feared that he had no depth of repentance. Overhearing some poor old women talking of the new birth and of the ways of resisting the devil, he became convinced that he "wanted the true tokens of a truly godly man." Though he meditated much on their sayings, though he gave up all his evil companions, and once or twice had visions of the way to salvation, two questions obtruded themselves, "Whether he was elected?" and "How if the day of grace should now be past and gone?" After much questioning, distress of mind, and manifold temptations that Satan put in his way, he gained some comfort from the Scriptures. The preaching and talk of Gifford, the Bedford minister, made him feel worse and worse; he seemed to himself to be utterly base and corrupt. Temporary comfort came in the Song of Solomon, but about "a month after, a very great storm came down upon me, which handled me twenty times worst than all I had met with before." Satan was continually with him; he feared that he had blasphemed against the Holy Ghost. This temptation lasted about

a year, but partly from texts in the Bible, and partly from the ministrations of Gifford and Luther's 'Comment on the Galatians,' he received some comfort. Even so, he was subject to another temptation, which endured a year, "to sell and part with the most blessed Christ." He feared that he had committed the unpardonable sin, and he was so torn between despair and hope that, after another conflict of three-quarters of a year, he fell into sickness. Even then he was tempted, but his mind and body grew whole together, and from this time on, about 1655, he seems to have felt himself redeemed.

In 1653 Bunyan joined the Bedford church, and two years later, "after I had been about five or six years awakened," he began preaching at the suggestion of "some of the most able of the saints." He was at first appalled by the gravity of his mission, but finding that he gave comfort to many he grew more confident. The secret of his success lay in the fact that "I preached what I felt, what I smartingly did feel; even that under which my poor soul did groan and tremble to astonishment." So great was the sincerity and success of his mission that he raised for himself much opposition among the Anglican divines, and was much slandered. Almost simultaneously, he began his very prolific career as author with a book of controversy directed against the Quakers, 'Some Gospel Truths Opened' (1656).

On 12 Nov. 1660, shortly after the return of Charles II., Bunyan was arrested for preaching. Refusing to flee or to agree not to preach, he was lodged in the Bedford county jail. Failing to get his case heard, he remained here for twelve years, except for a few weeks of liberty in 1666. During his unjust imprisonment, Bunyan had some access to the outside world, frequently visiting his church and once going as far as London. In the sense that he had much leisure to write, his confinement was of advantage to him. He composed and had published many books of which the most famous was 'Grace Abounding to the Chief of Sinners' (1666). On his release, in 1672, from jail, in accordance with the Declaration of Indulgence of Charles II., he became minister of the Bedford church. In 1675-76, Bunyan was again imprisoned, this time for six months in the small jail on Bedford bridge. The fact is important because it is probable that there he wrote, among other books, at least two-thirds of the first part of 'Pilgrim's Progress.' This part was first published in 1678, and a second edition with some additions, as the character of Mr. Worldly Wiseman, appeared the same year. The third came out early in 1679 and since then editions have been numberless. The second part appeared in January 1685. In the interval between the two were published the other books for which Bunyan is best known next to 'Pilgrim's Progress' and 'Grace Abounding'—'The Life and Death of Mr. Badman' (1680) and 'The Holy War' (1682). Aside from the imprisonment of 1685 and some persecution Bunyan's last years were quiet. His influence from his preaching and his writing was very widely diffused, and he was, in these respects, second to scarcely any man in England. He met his death in doing a characteristic act of

charity: having successfully reconciled a father and son at Reading, he was, while continuing his journey to London, overtaken by a rain storm and died from the effects of the exposure, in his sixtieth year.

Bunyan ranks among the most popular of English authors: his 'Pilgrim's Progress' is said to be read more widely than any other book in the language, except the Bible. It has been translated into over 70 foreign tongues. The reasons for its extraordinary vogue lie in the simplicity of the style, the fervor of the imagination, the universality of its spiritual appeal; no book is more widely intelligible or freer from sectarian dogmas. In all his books he appears as an unsurpassed master of a simple, direct, vernacular style.

Bibliography.— Editions of Bunyan's four more important works are numerous, and there are several of his collected works. Altogether he wrote about 60 books. Among the many lives that of the Rev. John Brown, 'John Bunyan, His Life, Times, and Work' (1885), is the most complete and authoritative. Froude's life in the 'English Men of Letters' (1880) and that by Canon Venables in the 'Great Writers Series' are also good; to the latter a full bibliography is added. Consult also Dowden, 'Puritan and Anglican Studies' (1901) and James *op. cit.* (1902).

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Bunzlau, boontz'low, the name of several European towns:

1. A town of Prussia, in the province of Silesia, near the Bober, 25 miles west of Liegnitz. It was formerly surrounded by fortifications, but handsome promenades now cover most of the area once occupied by them. In the market-place is an iron obelisk to the Russian general, Kutusov, who died here in 1819. Earthenware, glass, iron, etc., are manufactured. Pop. about 13,870.

2. **JUNG BUNZLAU**, a town of Bohemia, 31 miles northeast of Prague, the capital of the circle of Bunzlau. It stands on the left bank of the Iser, is well built, and has an old castle, an old and a new town-house, and other interesting buildings. Its inhabitants are chiefly engaged in manufacturing cottons, woolens, starch, sugar, spirits, beer, etc. Pop. about 11,500.

3. **ALT BUNZLAU**, a small town of Bohemia, situated on the Elbe.

Buol-Schauenstein, bwäl-show'en-stin, **Karl Ferdinand** (COUNT), Austrian statesman: b. 17 May 1797; d. Vienna, 28 Oct. 1865. He was minister in succession at Carlsruhe, Stuttgart, Turin, and St. Petersburg. He was second Austrian plenipotentiary at the Dresden Conference (1850), after which he was minister at London until the death of Schwarzenberg recalled him to Vienna to hold the portfolio of foreign affairs. He presided at the Vienna Conference in 1855, and represented Austria at the Congress of Paris.

Buonaparte, bwō-nā-pār'tē. See **BONAPARTE**.

Buonarotti, bwō-nār-rōt'tē, **Filippo**: b. Pisa, 11 Nov. 1761; d. Paris, 15 Sept. 1837. He received an excellent education under the auspices of the Grand Duke Leopold, but forfeiting the friendship of that prince on account of his sym-

pathies with the French revolutionists, he resorted to Corsica, where he commenced a journal of so inflammatory a character that he became involved in difficulties with the government. After having spent some time in Sardinia, where he was invited to draw up a liberal constitution for the people, he went to Paris to urge the desire of the people of the Corsican island of St. Pierre for annexation to France. French citizenship was conferred upon him; he was employed in important missions in Corsica and Oneglia, and became an ardent partisan of the Terrorists. Having been detained for some time in prison after the fall of Robespierre, he founded the Pantheon Association, and when this was dissolved by the government he joined the conspiracy of Babeuf and was sentenced to transportation, but was finally permitted to retire to Geneva, and afterward went to Brussels, where in 1828, he published his 'Conspiration de Babeuf.' Returning to Paris after the revolution of 1830, he spent the rest of his life in poverty and obscurity.

Buonarroti, Michael Angelo. See **MICHELANGELO**.

Buononcini, Giovanni Battista, jō-vān'nē bāt-tēs'tā bwō-nōn-chē'nē, Italian composer: b. Modena, 1672. In 1697 he went to Vienna and soon after to Berlin, where his opera 'Polifemo' had great success. After living a while at Rome, he went, in 1720, to London, and became there one of the most powerful rivals of Handel. Everything in England at that time was made to bear upon party politics, and Buononcini became the favorite of the Whigs, while Handel was supported by the Tories. But upon a trial of skill, in an opera of their joint composition, the talent and taste of Buononcini proved an unequal match for the genius of his rival.

Buontalenti, Bernardo, bér-nār'do bwōn-tā-lēn'tē (DELLE GIRANDOLE), Italian painter, sculptor, and architect: b. Florence, 1536; d. 6 June 1608. When 11 years of age an inundation of the Arno broke into the quarter of Florence where his family resided, and carried off every member of it except himself. Cosmo de Medici, on learning the disaster, received him into his palace, and improved the taste which he had displayed for drawing by placing him in the schools of Salviati, Bronzino, and Vasari. He displayed great versatility of mind, and excelled not only in the kindred arts of painting, sculpture, and architecture, but distinguished himself as a mathematician, a military engineer, and an inventor of machines.

Buoy, boo'y, any floating body employed to point out the particular situation of anything under water, as of a ship's anchor, a shoal, etc. They are of various shapes and constructions. The can buoy is of a conical form and is used for pointing out shoals, sand-banks, etc. Channel buoys are usually painted red on the star-board hand coming in from sea, and black on the port hand. They are also numbered in order from seaward, with even numbers on the star-board and odd numbers on the port hand. The cask buoy is in the form of a cask; the larger are employed for mooring, and are called mooring buoys. Spar buoys are wooden poles weighted at the thick end, by which they are moored. They are used in inland waters and in situations where, by reason of ice, iron buoys

would be damaged in winter. Whistling buoys are provided with apparatus, operated by the waves, which compresses air and discharges it through a whistle. A bell buoy is a large fixed buoy to which is attached a bell which is sounded by the heaving of the sea, serving as a signal in foggy weather. The life or safety buoy is intended to keep a person afloat till he can be taken from the water. Its most usual form is a ring of cork covered with painted canvas and having buckets at its circumference. Life buoys are sometimes equipped with a port-fire or signal light which is kindled by pulling a lanyard at the moment of heaving overboard. Gas buoys are charged with compressed gas and provided with a suitable burner. The gas being lighted, and burning continuously, such buoys serve as a guide at night. Electric buoys are illuminated by connection with power on shore by means of a cable.

Bupalus, bū'pā-lūs, Greek sculptor: fl. at Chios about 500 B.C. He and his brother Athenis are best known for their satirical conflict with the poet Hipponax. Augustus adorned many of the Roman temples with works of the two brothers, who used the pure white marble of Paros. Pausanias represents Bupalus as being an elegant architect as well as a sculptor.

Buphaga, bū-fa-ga, a genus of birds of the starling family (*Sturnidae*), whose species are found in various parts of Africa, where they are of great use from their habit of feeding on the parasites infesting cattle. They are popularly known as beef-eaters or ox-peckers, and are distinguished from the true starlings by a stouter beak, bare nostrils, more curved claws, and some other characters. The South African ox-pecker (*B. africana*) inhabits Natal, while farther north the genus is represented by a red-billed species (*B. erythrorhyncha*). A third species is found still farther north and also in the Transvaal.

Buphagus, in ancient mythology, a son of Japetus and Thoraax, who was killed by Diana for an attempt upon her chastity. A river of Arcadia was named after him. Buphagus was also one of the surnames of Hercules, which was given to him on account of his gluttony.

Buphonia, bū-fō'nyā (Gr. *Βουφόνιος* ox-killer), an ancient Athenian festival in honor of Zeus, celebrated every year on the 14th of Scirophorion, on the Acropolis. Barley and wheat were placed on the altar, and the ox destined for the sacrifice was permitted to go and eat the grain, when a priest armed with an axe sprang forward and slew the ox, and then severed himself. The other priests, as if not knowing the author of the deed, made inquiry, and, failing to ascertain anything, for lack of a better victim arraigned the axe, found it guilty, and condemned it. The Buphonia were also called Diipolia.

Bupthalmum, in botany, a genus of the *Syngenesia Polygamia Superflua*; natural order, *Compositæ Oppositifolia*; *Corymbifera*, Jussieu. Essential character: stigma of the hermaphrodite floscules undivided; seeds have the sides, especially in the ray, edged; receptacle chaffy. There are 12 species, of which *B. frutescens*, shrubby ox-eye, rises with several woody stems from the root, and grows to the height of 8 or 10 feet, furnished with leaves very unequal in

size, some of which are narrow and long, others broad and obtuse. The foot-stalks of the larger leaves have, on their upper side, near their base, two sharp teeth standing upward, and a little higher there are generally two or three more growing on the edge of the leaves. The flowers are produced at the ends of the branches, single; these are of a pale yellow color, and have scaly calyxes. It grows naturally in America. *B. arborescens*, tree ox-eye, seldom grows higher than three feet, sending out many stalks from the root, which are succulent; it has spear-shaped leaves, placed opposite; the flowers are produced upon foot-stalks, which are two inches long; the flowers are larger than those of the *B. frutescens*, and of a bright yellow color. They appear in July, August, and September. Some of the *Bupthalmum* plants are shrubs, but most of them are herbs. The flowers are commonly terminating, and mostly of a yellow color. See OX-EYE.

Buprasium, a town of ancient Greece, in Elis, often mentioned by Homer as one of the chief cities of the Epians. It had ceased to exist in the time of Strabo, but the name was still attached to a district situated on the left bank of the Larissus, and on the road leading from Dyme to Elis. The region is now identified with the plain of Bakouma.

Buprestidae, bu-prēs'tī-dē, a family of coleopterous insects (beetles), many of which are remarkable for the splendor of their appearance. This family is included in the pentamerous section of *Coleoptera*, which was formed by Latreille, and so named because the members of it have five joints in the tarsi. The characters of the *Buprestidae* are: body ovate, elongated, somewhat broad and obtuse in front, but pointed behind; eyes oval, with the antennæ inserted between them; jaws powerful. They walk slowly, but fly with great rapidity, especially in warm weather. They are very fond of sunning themselves on bushes or the branches of trees. When one attempts to seize them, sometimes even when one approaches them, they allow themselves to fall suddenly to the earth, or fly rapidly away. There are several hundred species belonging to this family, most of which are found within the tropics, and the tropical species are those which are chiefly distinguished by the brilliancy of their colors. The prevailing color appears to be green, but species are often found of a blue, red, golden, or other color. The *B. gigas* of Linnæus, which is about two inches in length, and one of the largest of the family, has bright golden elytra, or wing-cases, which are often used as ornaments by the inhabitants of South America, of which continent it is a native.

Bura, in ancient mythology, a daughter of Jupiter, or, according to some authorities, the offspring of Ion and Helice, from whom Bura, or Buris, once a flourishing city of ancient Greece, on the Bay of Corinth, received its name.

Bura, in ancient Greece, one of the 12 original Achæan cities, which stood formerly close to the sea, on the Bay of Corinth, but, having been destroyed, with the neighboring town of Helice, by a terrible earthquake, the surviving inhabitants rebuilt it afterward about 40 stadia from the coast, and near the small river

BUR-MARIGOLD — BURBANK

Buraicus. Bura was situated on a hill, and contained temples of Ceres, Venus, Bacchus, and Lucina, the statues of which were sculptured by Euclidas of Athens. On the banks of the river Buraicus was a cave consecrated to Hercules, and an oracle usually consulted by the throwing of dice. The ruins of Bura are close to the road from Megastelia to Vostitza, and the cave of Hercules Buraicus is visited by tourists.

Bur-marigold, a large genus of annual and perennial herbs (*Bidens*) of the natural order *Compositae*, mostly natives of North America, but widely distributed in other countries, chiefly as weeds, but some as garden plants. The best known ornamental species is *B. grandiflora*, a native of South America; and the most common North American species is *B. frondosa*, which is popularly and variously known as devil's bootjack, stick-tight, beggar-tick, Spanish-needle, etc., and is especially troublesome in wool and on clothing, to which the seeds stick like burs.

Burbank, Luther, American plant breeder: b. Lancaster, Worcester county, Mass., 7 March 1849; of English-Scotch ancestry; educated in common schools and local academy; worked as a boy in a plow factory, showing some inventive capacity, but soon began market-gardening and seed-raising in a small way, and developed the Burbank potato in 1873; removed to Santa Rosa, Cal., 1 Oct. 1875, where he has since resided and carried on his work. His many and important "new creations" of fruits, flowers and vegetables have made him the best-known plant-breeder in America, and probably in the world. The characteristics which are the special factors in the success of his work are, the large extent of his experiments, his keenness of preception of slight variations in plant-qualities, and the rapidity with which he develops new qualities, this rapidity being due to a combination of multiple hybridizing, selection, and grafting of seedling plants on mature stocks, so that immediate results as to flowers and fruits are got from seedling stems. But the final and most important factor in Burbank's success is the inherent personal genius of the man, whose innate sympathy with Nature, aided by the practical education in plant biology derived from thirty years of constant study and experiment, enable him to perceive correlations and outcomes of plant growth which seem to have been visible to no other man. As the history of Burbank's life is the history of his work, the remainder of this biographical sketch may advantageously be devoted to a brief consideration of the character and method of creation of some of his principal new plant varieties.

Burbank has originated and introduced a remarkable series of plums and prunes. No less than twenty varieties are included in his list of offerings, and some of them, notably the Gold, Wickson, Apple, October Purple, Chasco, American and Climax plums and the Splendor and Sugar prunes are among the best known and most successful kinds now grown. In addition he is now perfecting a stoneless plum, and has created the interesting plum-cot by hybridizing the Japanese plum and the apricot. The plum-cot, however, has not yet become a fixed variety and may never be, as it tends to revert to the plum. The stoneless and seedless plum is being produced by selection from the descendants of

the crossing of a single fruit in a small wild plum with only part of a stone with the French prune; the percentage of stoneless fruits is gradually increasing with succeeding generations. The sugar prune, which promises to supplant the French prune in California, is a selected product of a second or third generation variety of the *Petite d'Agen*, a very variable French prune. The Bartlett plum, cross of the bitter Chinese *simoni* and the Delaware, a Burbank hybrid, has the exact fragrance and flavor of the Bartlett pear. The Climax is a cross of the *simoni* and the Japanese *triflora*. The Chinese *simoni* produces almost no pollen, but few grains of it ever having been obtained, but these few grains have enabled Burbank to revolutionize the whole plum shipping industry. Most of Burbank's plums and prunes are the result of multiple crossings, in which the Japanese Satsuma has played an important part. Hundreds of thousands of seedlings have been grown and carefully worked over in the twenty years' experimenting with plums, and single trees have been made to carry as many as 600 varying seedling grafts.

Burbank has originated and introduced the Van Deman, Santa Rosa, Alpha, Pineapple, "No. 80," the flowering Dazzle, and other quinces; the Opulent peach, cross-bred from the Muir and Wager; the Winterstein apple, a seedling variety of the Gravenstein; and has made interesting, although not profitable, crosses of the peach and nectarine, peach and almond, and plum and almond.

Next in extent, probably, to his work with plums is his long and successful experimentation with berries. This work has extended through twenty-five years of constant attention, has involved the use of forty different species of *Rubus*, and has resulted in the origination and introduction of a score of new commercial varieties mostly obtained through various hybridizations of dewberries, blackberries, and raspberries. Among these may especially be mentioned the Primus, a hybrid of the Western dewberry (*R. ursinus*) and the Siberian raspberry (*R. crataegifolius*), fixed in the first generation, which ripens its main crop before most of the standard, well-known varieties of raspberries and blackberries commence to bloom; the Iceberg, a cross-bred white blackberry derived from a hybridization of the Crystal White (pistillate parent) with the Lawton (staminate parent), and with beautiful snow-white berries so nearly transparent that the small seeds may be seen in them; the Japanese Golden Mayberry, a cross of the Japanese *R. palmatus* (with small, tasteless, dingy yellow worthless berries) and the Cuthbert, the hybrid growing into tree-like bushes six to eight feet high and bearing great, sweet, golden, semi-translucent berries which ripen before strawberries; and Paradox, an oval, light-red berry obtained in the fourth generation from a cross of Crystal White Blackberry and Shaffer's Colossal Raspberry. While most of the plants from this cross are partly or wholly barren, this particular outcome is an unusually prolific fruit producer. An interesting feature of Mr. Burbank's brief account, in his "New Creations" catalogue of 1894, of the berry experimentation, is a reproduction of a photograph showing "a sample pile of brush twelve feet wide, fourteen feet high and twenty-two feet long, containing 65,000 two and three-year-

BURBOT — BURBRIDGE

old seedling berry bushes (40,000 Blackberry X Raspberry hybrids and 25,000 Shaffer X Gregg hybrids) all dug up with their crop of ripening berries." The photograph is introduced to give the reader some idea of the work necessary to produce a satisfactory new race of berries. "Of the 40,000 Blackberry-Raspberry hybrids of this kind 'Paradox' is the only one now in existence. From the other 25,000 hybrids two dozen bushes were reserved for further trial."

Leaving Burbank's other fruit and berry creations unreferred to, we may refer to his curious cross-bred walnut results, the most astonishing of which is a hybrid between *Juglans californica* (staminate parent) and *J. nigra* (pistillate parent), which grows with an amazing vigor and rapidity, the trees increasing in size at least twice as fast as the combined growth of both parents, and the clean-cut, glossy, bright-green leaves, from two to three feet long, having a sweet odor like that of apples. This hybrid produces no nuts, but curiously enough the result of the reverse hybridization (i. e., pollen from *nigra* on pistils of *californica*) produces in abundance large nuts of a quality superior to that possessed by either parent.

Of new vegetables Burbank has introduced, besides the Burbank and several other new potatoes, new tomatoes, squashes, asparagus, etc. Perhaps the most interesting of his experiments in this field is his attempt, apparently destined to be successful, to produce a spineless and spicule-less cactus (the spicules are the minute spines, much more dangerous and harder to get rid of than the conspicuous long, thorn-like spines), edible for stock, and indeed for man. This work is chiefly one of pure selection, for the cross-bred forms seem to tend strongly to revert to the ancestral spiny condition.

Among the many new flower varieties originated by Burbank may be mentioned the Peach-blow, Burbank, Coquito, and Santa Rosa roses, the Splendor, Fragrance (a fragrant form) and Dwarf Snowflake callas, the enormous Shasta and Alaska daisies, the Ostrich plume, Waverly, Snowdrift and Double clematises, the Hybrid Wax myrtle, the extraordinary Nicotunia, a hybrid between a large, flowering Nicotiana and a petunia, several hybrid Nicotianas, a dozen new gladioli, an ampelopsis, several amaryllids, various dahlias, the Fire poppy (a brilliant flame colored variety obtained from a cross of two white forms) striped and carnelian poppies, a blue Shirley (obtained by selection from the Crimson field poppy of Europe), the Silver Line poppy (obtained by selection from an individual of *Papaver umbrosum* showing a streak of silver inside), with silver interior and crimson exterior, and a crimson California poppy (*Escholtzia*) obtained by selection from the familiar golden form. Perhaps his most extensive experimenting with flowers has been done in the hybridizing of lilies, a field in which many plant breeders have found great difficulties. Using over half a hundred varieties as basis of his work, Burbank has produced a great variety of new forms. "Can my thoughts be imagined," he says, in his "New Creations" of 1893, "after so many years of patient care and labor [he had been working over sixteen years], as, walking among them [his new lilies] on a dewy morning, I look upon these new forms of beauty, on which other eyes have never gazed? Here a plant six feet high, with

yellow flowers, beside it one only six inches high with dark red flowers, and further on one of pale straw, or snowy white, or with curious dots and shadings: some deliciously fragrant, others faintly so; some with upright, others with nodding flowers: some with dark green, woolly leaves in whorls, or with polished light green, lance-like, scattered leaves."

So far no special reference has been made to the more strictly scientific aspects of Burbank's work. Burbank has been primarily intent on the production of new and improved fruits, flowers, vegetables and trees for the immediate benefit of mankind. But where biological experimentation is being carried on so extensively it is obvious that there must be a large accumulation of data of much scientific value in its relation to the great problems of heredity, variation, and species-forming. Burbank's experimental gardens may be looked on from the point of view of the biologist and evolutionist as a great laboratory in which, at present, masses of valuable data are, for lack of time and means, being let go unrecorded. The Carnegie Institution has therefore made a grant of \$100,000 to Burbank, payable \$10,000 annually, beginning with 1905, to enable him to note, collect and collate the scientific data which his extensive experimentation is constantly affording. Of Burbank's own particular scientific beliefs touching the "grand problems" of heredity we have space to record but two: first, he is a thorough believer in the inheritance of acquired characters, a condition disbelieved in by the Weismann school of evolutionists; second, he believes in the constant mutability of species, and the strong individuality of each plant organism, holding that the apparent fixity of characteristics is a phenomenon wholly dependent, for its degree of reality, on the length of time this characteristic has been ontogenetically repeated in the phylogeny of the race.

For other accounts of Burbank and his work, see articles in the illustrated magazines of 1903 and 1904, and "New Creations in Plant Life," by W. S. Harwood. Burbank has written but little himself, namely, only a few essays to be read at horticultural and other meetings, the article on Plant-breeding in this Encyclopedia, Vol. III, and his short series of catalogues, 1893-1901, called "New Creations."

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Bur'bot, a fresh-water fish (*Lota lota*) of the cod family, inhabiting northern Europe and America. It is numerous in the inland waters of the northern States and Canada, where it displays the nocturnal voracity of its race. It ordinarily weighs about five pounds, but has little market value. It is more often called cusk, ling, or loche among us, than burbot, which is the British designation.

Burbridge, Stephen Gano, American soldier: b. Scott County, Ky., 19 Aug. 1831; d. 1894. He organized the famous 26th Kentucky Regiment, which he led for the Union at Shiloh, where he was promoted to the rank of brigadier-general of volunteers. He was engaged in the Vicksburg expedition under Gen. Grant; led the charge at Arkansas Post and at Port Gibson, being the first to enter each of these places; was retired with the brevet of major-general in 1865.

BURCHARD — BURDEN

Burchard, Samuel Dickinson, American clergyman: b. Steuben, N. Y., 6 Sept. 1812; d. Saratoga, N. Y., 25 Sept. 1891. He was for many years a Presbyterian pastor in New York. During the presidential campaign of 1884 a company of clergymen, about 600 in number, called on James G. Blaine, the Republican candidate, at the Fifth Avenue Hotel, New York. Dr. Burchard made an address, in which he affirmed that the antecedents of the Democracy were "rum, Romanism, and rebellion," and this denunciatory speech on the very eve of the election created intense excitement throughout the United States and alienated from Blaine many Democratic votes upon which he had reckoned. It is generally conceded that Burchard was thus largely instrumental in electing Grover Cleveland.

Bur'chell, William John, English explorer: b. Fulham, about 1782; d. 1863. He was in the service of the East India Company on the island of St. Helena, 1805-10, and then went to South Africa. Here he spent several years in exploring and making a large natural-history collection. In 1825 he made a tour in South America. On all his expeditions he was generally entirely alone. A large part of his collections are now in the British Museum.

Burchiello, Domenico, dō-mā-nē'kō boor-kē-ē'l'ō, Italian poet: fl. 15th century, at Florence, where he was probably born. He was the son of a barber named Giovanni, and was called originally only Domenico. He assumed the name of Burchiello afterward for reasons that cannot be assigned. His fame began about 1425. He was first registered as a barber in 1432. Some writers have reproached him for shameful vices, and represented him as a low buffoon who did everything for money. Others have defended him. His shop was so famous that learned and unlearned, high and low, assembled there every day, and Cosmo the Great caused a picture of it to be painted on one of the arches of his gallery. It appears here divided into two portions; in one Burchiello is acting the part of a barber; in the other that of a musician and poet. The portrait of Burchiello himself is painted over his shop. It is extremely difficult to decide upon the absolute value of his satires, as the local and personal allusions in them are obscure. They were composed for his contemporaries, with a studied obscurity and extravagance of expression. His style is, nevertheless, pure and elegant. His burlesque sonnets are enigmas, of which we have no intelligible explanation, notwithstanding what Doni has done. The narrative and descriptive parts are very easy to be understood; but the wit they contain is, for the most part, so coarse, that the satire fails of producing its effect. They are, on the whole, lively, but licentious. The best editions of his sonnets are those of Florence, 1568, and of London, 1757.

Burckhardt, boork'hart, Johann, yō'hān, Karl, German astronomer: b. Leipsic, 30 April 1773; d. 22 June 1825. He acquired a fondness for astronomy from the study of the works of Lalande, and made himself master, at the same time, of nearly all the European languages. He wrote a Latin treatise 'On the Combinatory Analytic Method' (Leipsic 1794). He then studied practical astronomy with Baron von Zach at the latter's observatory on the See-

berg, near Gotha, and assisted his patron, from 1795-7, in observing the right ascension of the stars. Von Zach recommended him to Lalande, at Paris, who received him at his house 15 Dec. 1797. Here he distinguished himself by the calculation of the orbits of comets; participated in all the labors of Lalande and those of his nephew Lefrançois Lalande; took an active part in the observatory of the Ecole Militaire; and translated the first two volumes of Laplace's 'Mécanique Céleste' into German (Berlin 1800-2). Being appointed adjunct astronomer by the board of longitude, he received letters of naturalization as a French citizen 20 Dec. 1799. His important treatise on the comet of 1770, which had not been visible for nearly 30 years, although, according to the calculations of its orbit, it should have returned every five or six, was rewarded with a gold medal by the Institute in 1800. This treatise, which proposed some improvements in Dr. Olbers' mode of calculation, is contained in the 'Memoires de l'Institut' for 1806. During this year he was made a member of the department of physical and mathematical sciences in the Academy; in 1818 was made a member of the board of longitude; and, after Lalande's death, astronomer in the observatory of the Ecole Militaire. In 1814 and 1816 he published in French, at Paris, 'Tables to Assist in Astronomical Calculations.' He also wrote some treatises in Von Zach's 'Geographical Ephemerides.' His labors in the board of longitude were particularly valuable.

Burckhardt, Johann Ludwig, yō'hān lood'-vīg boork'härt, Swiss explorer: b. Lausanne, 24 Nov. 1784; d. Cairo, 17 Oct. 1817. He studied at Leipsic, Göttingen, and London, giving special attention to Arabic. In 1809 he started on an expedition to Africa for the African Association at London; assuming the disguise of an Oriental at Malta he went to Aleppo and remained there over a year and a half studying Arabic and the history of Mohammedanism. Then he visited Damascus and traveled through Palestine to Cairo, arriving there in September 1812; here he joined a caravan going through the Nubian Desert by a route never before traveled by Europeans, and reached the Red Sea in July 1814. He then crossed over to Asia Minor and went to Mecca, where he became a Moslem and joined a body of pilgrims going to Mount Ararat. In 1815 he returned to Cairo and from there traveled through the region of Mount Sinai, climbing the mountain. Shortly after his return from this trip he died of the fever just as he was about to start on another expedition. He was the author of 'Travels in Nubia' (1819); 'Travels in Syria and the Holy Land' (1822); 'Travels in Arabia' (1829); 'Notes on the Bedouins and Wahabys' (1830); 'Arabic Proverbs' (1830).

Bur'dekin, a river of the northeast of Queensland, with a course of about 350 miles. With its affluents it waters a large extent of country, but it is useless for navigation.

Burden, Henry, American inventor: b. Dumbane, Scotland, 20 April 1791; d. Troy, N. Y., 19 Jan. 1871. He was brought up on a farm, and at an early age showed his inventive genius by making a variety of labor-saving machinery, including a threshing-machine. He came to the United States in 1819 and engaged in the manufacture of agricultural implements.

BURDEN OF PROOF — BURDICK

He invented an improved plow; the first cultivator made in this country; machines for making horse-shoes and hook-headed spikes used on railroads; a self-acting machine for rolling iron into bars; and a new machine for making horse-shoes, which received a rod of iron and turned out completed shoes at the rate of 60 a minute.

Burden of Proof, in legal procedure, the obligation to establish by evidence certain disputed facts. As a general rule this burden lies on the party asserting the affirmative of the issue to be tried or question in dispute, or on the party who would fail if no evidence were adduced on either side. Burden of proof is to be distinguished from *prima facie* evidence or a *prima facie* case. Generally, when the latter is shown, the duty imposed upon the party having the burden will be satisfied; but it is not necessarily so. In criminal cases, on the two-fold ground that a prosecutor must prove every fact necessary to substantiate his charge against a prisoner, and that the law will presume innocence in the absence of convincing evidence to the contrary, the burden of proof, unless shifted by legislative interference, will, in criminal proceedings, be on the prosecuting party, though in order to convict he must necessarily have recourse to negative evidence. The burden of proof throughout is on the government. This subject is treated by all writers on Evidence, as Taylor, Roscoe, and Powell in England; Dickson in Scotland; and Greenleaf in the United States. Consult also Bentham's 'Rationale of Judicial Evidence.'

Burdett, Sir Francis, English politician: b. 25 Jan. 1770; d. 23 Jan. 1844. He was educated at Westminster, and after two years at Oxford made a Continental tour. In 1796 he obtained a seat in Parliament through the patronage of the Duke of Newcastle; but he soon abandoned the Tory party and made himself conspicuous by his advocacy of liberal measures. In 1802 he stood for Middlesex, but though at first elected he finally lost his seat in 1806, after much costly litigation. He was more successful in 1807 at Westminster, where his election at the head of the poll was hailed as a great popular triumph. In 1810 he published a letter in Cobbett's 'Political Register,' denying the right of the House of Commons to imprison for libel, as they had recently done in the case of John Gale Jones. This letter, having been brought under the notice of the House, was declared a gross breach of its privileges, and a warrant was issued by the speaker for the committal of Sir Francis to the Tower. He denied the legality of the warrant, and declared his determination to surrender only to force. The public mind was strongly agitated; but prorogation of Parliament relieved him from his imprisonment in the Tower, and he became perhaps the most popular man in the kingdom. In attaining this popularity he was greatly aided by the graces of his appearance and the talents which he undoubtedly possessed. Ultimately, however, his fervor cooled, and he owed his last seat in Parliament to the Conservatives of Wiltshire.

Burdett, Sir Henry, English publicist and statistician: b. 1847. He served in an administrative capacity in the Queen's Hospital, Birmingham, and the Seaman's Hospital, Green-

wich, and was secretary of a department of the London Stock Exchange. He was founder and editor of 'The Hospital.' His works are numerous, and cover a wide range. Among them are 'Official Intelligence of British, American, and Foreign Securities' (17 vols.); 'The National Debt'; 'National Debts of the World'; 'Local Taxation in England and Wales'; 'Colonial Loans, Finance, and Development'; 'Seventeen Years of Securities'; 'The Admiralty and the Country'; 'Hospitals and Asylums of the World'; 'Hospitals and Charities, a Year-book of Philanthropy'; 'Hospitals and the State'; 'Architects, Hospitals, and Asylums'; 'A Practical Scheme for Old Age Pensions'; 'The Nursing Profession'; 'Housing of the Poor'; and 'Official Nursing Directory.'

Burdett-Coutts, Right Hon. Angela Georgina (Baroness), English philanthropist: b. 21 April 1814; d. London 30 Dec. 1906. In 1837 she inherited much of the property of her grandfather, Thomas Coutts, the banker, on the death of his widow, the Duchess of St. Albans (formerly the actress, Miss Mellon). Besides spending large sums of money in building and endowing churches and schools, she endowed the three colonial bishoprics of Cape Town, Adelaide, and British Columbia. She founded an establishment in South Australia for the improvement of the aborigines, and established a fishery school at the Irish village of Baltimore (1887). To the city of London she presented, besides several handsome fountains, the Columbia Market, Bethnal Green (1870), for the supply of fish in a poor district. She also built Columbia Square, consisting of model dwellings at low rents, for about 300 families. The home established by her at Shepherd's Bush has rendered great assistance to many unfortunate women, and the People's Palace owes much to her generosity. In 1871 she was created a peeress in her own right as Baroness Burdett-Coutts. In 1877 she organized the Turkish Compassionate Fund, to relieve the sufferings of the peasants in Turkey, and in recognition of her services the Sultan conferred upon her the Order of the Medjidie. In 1881 she was married to William Ashmead-Bartlett, who in 1882 obtained the royal license to assume her name.

Burdette, Robert Jones, American humorist: b. Greensboro, Pa., 30 July 1844. He served in the Union army during the Civil War. He is famous for humorous newspaper skits, of rare variety, charm, and unrepentitious freshness; begun in the Burlington (Iowa) *Hawkeye*, of which he became associate editor in 1874. Among his works are: 'The Rise and Fall of the Moustache,' a lecture (1877); 'Hawkeyes,' collected articles (1880); 'Life of William Penn' (1882); 'Sons of Asaph'; 'Chimes from a Jester's Bells'; etc. He was licensed as a Baptist clergyman in 1887.

Burdick, Francis Marion, American jurist: b. De Ruyter, N. Y., 1 Aug. 1845. He was graduated at Hamilton College in 1869, and at its law school in 1872. He practised law in Utica, N. Y., from 1872 to 1883, and was later professor of law at Hamilton College, and at Cornell. Since 1891 he has been professor of law at Columbia. He has written 'Law of Sales'; 'Law of Partnership'; and other legal textbooks.

BURDOCK—BURGER

Burdock, a small genus (*Arctium*) of coarse perennial or biennial herbs of the natural order *Compositæ*, natives of temperate Asia and Europe, but widely distributed as weeds throughout the world. Common burdock (*A. lappa*), which often attains a height of four feet, is sometimes planted in flower-borders for its foliage, which makes a good screen; and in Japan, where it has been improved by cultivation, for its enlarged parsnip-like roots, which are eaten as a boiled vegetable. Formerly the roots were used in medicine, but they seem to be generally classed with many other domestic remedies of doubtful value. The plant is best known as a weed in waste land, but usually on good soil. Its globular burs become attached to the wool of sheep and to clothing. Their presence injures the price of wool.

Burdwan, bürd-wän, or **Bardwan**, bär-dwan', India, a town and capital of a division of the same name in the lower provinces of Bengal, on the left bank of the Damoda, 68 miles northwest of Calcutta, with which it is connected by railway. There is a titular rajah of Burdwan, who resides here in a spacious palace, with gardens, etc.; and there are also a large collection of temples and a shrine of Pirba-haram. Pop. 34,477. The division has an area of 13,956 square miles, and a population of about 8,250,000, and is divided into the districts of Burdwan, Bankura, Birbhum, Hugli, Midnapur, and Howrah. The chief crops are sugar, indigo, tobacco, cotton, and the usual cereals. Mulberry-trees are cultivated, and coal is raised.

Bureau, bü-rō, or bü-rō', the chamber or official apartments of an officer of government, and the body of subordinate officials who labor under the direction of a chief. The term "bureau system," or "bureaucracy," is applied to those systems of government in which the business of administration is carried on in departments, each under the control of a chief; and is opposed to those in which the officers of government have a co-ordinate authority. Sometimes a mixture of the two systems is found. Thus the business of the executive branch of government may be carried on by bureaus, while the administration of justice is in the hands of co-ordinate judges. In the United States, bureau is the universal word for a chest of drawers.

Burette, bü-ret', a graduated glass tube occasionally used for dividing a given portion of any liquid into small quantities of a definite amount.

Burg, Adriaan (ä'drē-än) van der, Dutch painter: b. Dordrecht, 1693; d. 1733. He studied under Arnold Houbraken, distinguished himself by his portraits, and acquired a reputation which would soon have procured him an independence. But intemperate habits rendered his talents of no avail, and hurried him to a premature grave. His freedom of touch and fine coloring are his distinguishing excellences. His best-known pieces are two large pictures at Dordrecht, one of which gives on a single canvas portraits of the managers of the orphan hospital, and the other portraits of the officers of the Mint.

Burg, Johann (yō'hän) Tobias, Austrian astronomer: b. Vienna, 1766; d. 1834. He attracted the notice of Van Swieten, who was then at the head of the commission appointed to reform the scholastic estab-

lishments of Austria, and through his patronage obtained the means of prosecuting the study of mathematics, and more especially of astronomy, for which he showed a decided inclination. In 1791 he became professor of physics at Klagenfurt, and in 1792 was appointed colleague of Trisnecker at the Observatory of Vienna. In 1798, the French Institute having proposed a prize for the determination, by at least 500 observations, of the mean place of the apogee and ascending node of the moon, Burg sent in a memoir in which the determination was made by a most accurate and ingenious method, not from 500 but 3,232 observations. The tables contained in it were afterward published by the Institute, and constitute the chief foundation of his fame. In 1813 he became almost entirely deaf and retired from public life to Wiesenau, Carinthia.

Burg, Prussia, a town in the province of Saxony, 12 miles northeast of Magdeburg, on the Ihle, where it joins a canal uniting the Havel with the Elbe. It has four churches, a hospital, a gymnasium, and a well-endowed institution for the bringing up of orphan children, and is the seat of civil and judicial administration for the circle. Its manufactures are extensive, especially of woollens, for which it was a centre as early as the 12th century. Cloths for army purposes are largely made. There are also spinning mills, dye works, machine works, tanneries, oil works, etc.

Bur'gage Tenure, in England, a tenure in socage, whereby burgesses, citizens, or townsmen hold their lands or tenements of the king or other lord for a certain yearly rent. In Scotland that tenure by which the property in royal burghs is held under the Crown, proprietors being liable to the (nominal) service of watching and warding, or, as it is commonly termed, "service of burgh, used and wont."

Burgas, boor-gäs', or **Bourgas**, Turkey, a seaport of the province of eastern Rumelia, situated on the Black Sea. The bay on which it stands is of sufficient depth for large vessels, and the exports are grain, iron, butter, wine, and also woollen goods for Constantinople. The principal source of the prosperity of the town is the manufacture of pottery, pipe-bowls, cups, etc., for which a superior clay is found in the neighborhood. Pop. about 12,000.

Burgdorf, boorg'dôrf, Switzerland, a town in the canton of Bern, situated on the Emmen. It is the entrepôt for the linen goods and cheeses of the Emmenthal. The castle which stands here was formerly a place of great strength. Pestalozzi resided from 1798 to 1804 in the château of Burgdorf, and converted it into an educational institution. In the vicinity are the baths of Sommerhaus. Pop. 8,400.

Bur'geo Islands, Newfoundland, a group of islands on the southern coast, much visited by summer tourists and artists from the eastern States and Canada. The population is chiefly engaged in fishing. Burgeo, the principal town, has a population of less than 1,000.

Bür'ger, Gottfried August, göt'frēd ow'-goost, German poet: b. 1 Jan. 1748, at Wolmerswende, near Halberstadt; d. Göttingen, 8 June 1794. He showed an early predilection for solitary and gloomy places and the making of verses, for which he had no other model than

BURGER — BURGESS

hymn-books. He learned Latin with difficulty. In 1764 he studied theology at the University of Halle, and in 1768 he went to Göttingen, in order to exchange theology for law, but soon formed connections here equally disadvantageous to his studies and his morals, so that his grandfather, who had hitherto maintained him, withdrew his support. The friendship of several distinguished young men at the university was now of great service to him. He studied the ancient classics and the best works in French, Italian, Spanish, and English, particularly Shakespeare, and the old English and Scottish ballads. Percy's 'Reliques' was his constant companion. His poems soon attracted attention. In 1772 he obtained the office of baillie in Alten-Gleichen, but throughout his life he was involved in pecuniary difficulties. In 1774, he married the daughter of a neighboring baillie, named Leonhart, but his marriage was unfortunate. He conceived a violent passion for the sister of his wife, and married her, in 1784, soon after his first wife's death. She also, his celebrated "Molly," died in the first year of their marriage. At the same time he was obliged, by intrigues, to resign his place. He was made professor extraordinary in Göttingen, but received no salary, and this favorite poet of the nation was obliged to gain his living by poorly rewarded translations for booksellers. A third marriage in 1790, with a young lady of Swabia, who had publicly offered him her hand in a poem, completed his misfortunes; he procured a divorce from her two years afterward. The government of Hanover afforded him some assistance shortly before his death. His songs, odes, elegies, ballads, narrative poems, and epigrams hold a very high place in German literature, Schlegel especially commending his work, though Schiller criticised him very severely. The first collection of his poems appeared in Göttingen in 1778. His complete works were first published by Reinhard at Göttingen in four volumes in 1796-8, and this edition has been repeatedly published since. Other editions of his works and letters have also been published, and his life has been written by Döring, Pröhle ('G. A. Bürger: Sein Leben und Seine Dichtungen,' Leipsic, 1865), and others.

Burger, Ludwig, lood'vig boor'gér, German painter and illustrator: b. Cracow, 19 Sept. 1825. He studied at the Berlin Art Academy, at the same time working at book-illustrating, he was also a pupil of Couture in Paris. Among his best drawings are the illustrations for the works of La Fontaine and a collection of 20 plates known as 'Die Kanone.' Since 1869 he has done considerable work in interior decoration, particularly at the Berlin city hall.

Burgers, boor'gér, Thomas Francis, Transvaal statesman: b. Cape Colony, 1834; d. 1881. He was educated for the ministry at Utrecht and was pastor of the Dutch Reformed Church of Hanover, Cape Colony. Some of the rationalistic views he expressed led to his trial for heresy, but he was acquitted. He was elected president of the Transvaal republic in 1872 and held the office until 1877, when the republic was annexed by Great Britain.

Burges, ber'jés, Tristram, American statesman and orator: b. Rochester, Mass., 26 Feb. 1770; d. Providence, R. I., 13 Oct. 1853. When 15 years old he attended a school in the vicinity

for six weeks, and again the next year for six weeks more. This was all the instruction he received from others until he reached the age of 21. In September 1793, he entered Rhode Island College, now Brown University, graduated three years later with the first honors of his class, and was admitted to the bar in 1799. He became a leader of the Federal party, and in 1811 was elected to a seat in the State legislature. In 1815 he was made chief justice of Rhode Island, and afterward became professor of oratory and belles-lettres in Brown University. In 1825 he was elected to Congress, and almost immediately achieved a national reputation by his speech on the judiciary. He continued in Congress until 1835. Many of his most brilliant efforts were in defense of the American tariff system, and his logic and sarcasm won for him an unrivaled reputation as a debater. See Bowen, 'Memoirs of Tristram Burges.'

Bur'gess, Alexander, American Protestant Episcopal bishop: b. Providence, R. I., 31 Oct. 1819; d. St. Albans, Vt., 8 Oct. 1901. He was a younger brother of George Burgess, first bishop of Maine. He was graduated from Brown University in 1838, and from the General Theological Seminary in 1841. He was successively rector at East Haddam, Conn., 1842-3; St. Mark's, Augusta, Me., 1843-54; St. Luke's, Portland, Me., 1854-67; St. John's, Brooklyn, N. Y., 1867-9; and Christ Church, Springfield, Mass., 1869-78. In 1878 he was consecrated first bishop of the diocese of Quincy, Ill. He wrote a popular religious text-book, 'Questions for Bible-Classes and Sunday-schools' (1855), and a 'M memoir of the Life of George Burgess, First Bishop of Maine' (1869).

Bur'gess, Edward, American naval architect: b. West Sandwich, Mass., 30 June 1848; d. Boston, 12 July 1891. He was educated at Harvard, where he graduated in 1871, and became secretary of the Boston Society of Natural History. He was instructor of entomology at Harvard from 1879 to 1883. He then became a designer of sailing-yachts. In 1884 he designed the Puritan, the winner of the America's cup in 1885; and a year later the Mayflower, the winner in 1886. He was also the designer of the Volunteer, which won the cup in 1887.

Burgess, Frank Gullett, American humorous writer and illustrator: b. Boston, 30 Jan. 1866. He was graduated from the Massachusetts Institute of Technology in 1887; was a draughtsman with the Southern P. Ry. 1887-90, and instructor in topographical drawing in the University of California, 1891-4. In 1895-7 he came prominently before the reading public as a publisher and writer of eccentric and humorous literature, such as his journal called 'The Lark,' and poem, 'The Purple Cow' (1897). In 1898 he removed to London, but returned to America in 1900. He edited 'Petit Journal des Refusées' (1897), and has written 'The Lark Almanac' (1898); 'Vivette' (1898); 'The Nonsense Almanac' (1898); 'The Lively City o' Ligg' (1898); 'Gooops and How to be Them' (1900); 'A Joyous Journey Round the Year' (1901); 'Romance of the Commonplace' (1902); 'A Gage of Youth' (1901).

Burgess, George, bishop of Maine: b. Providence, R. I., 31 Oct. 1809; d. Haiti, 23 April 1866. After graduating at Brown Uni-

BURGESS — BURGLARY

versity, and holding a tutorship in that college, he traveled in Europe, and studied for two years in the universities of Göttingen, Bonn, and Berlin. He was rector of Christ Church in Hartford from 1834 to 1847, when he was consecrated first bishop of the diocese of Maine, and became, at the same time, rector of Christ Church in Gardiner. Both offices he filled with great ability. He published two academic poems, a metrical version of a portion of the Psalms, 'Pages from the Ecclesiastical History of New England' (1847); 'The Last Enemy Conquering and Conquered' (1850), and various sermons.

Burgess, James, Scottish archæologist: b. Kirkmahoe, Dumfriesshire, 14 Aug. 1832. He went to India in 1855, and there entered upon educational work in Calcutta and Bombay. In 1886 he was made director-general of the archæological surveys of India, retiring under age limit in 1889. From 1872 to 1884 he published the 'Indian Antiquary.' His works include: 'The Temples of Shatrunjaya' (1869); 'The Rock Temples of Elephanta' (1871); 'Scenery and Architecture in Gujarat and Rajputana' (1873); and other books; also many writings in the 'Epigraphia Indica,' 'Archæological Reports' (1874-87), etc.

Burgess, John William, American educator: b. Cornersville, Tenn., 26 Aug. 1844. He was educated at Cumberland University, Lebanon, Tenn., and at Amherst College, Mass., graduating there in 1867; studied law, and began to practise in 1869. During this year he was appointed professor of English literature and political economy at Knox College, Galesburg, Ill. Two years later he studied in Göttingen, Leipsic, and Berlin. On his return, he became professor of history and political science at Amherst, in 1870 professor of history, political science, and international law in Columbia College, and in 1880 professor of constitutional and international history and law. In 1906 he became Roosevelt Professor of American history and institutions at Berlin University. He has published 'Political Science and Comparative Constitutional Law' (1890); 'The Middle Period of United States History' (1897); 'The Civil War and the Constitution' (1901); 'Reconstruction and the Constitution' (1902); etc.

Burgess, Neil, American actor: b. Boston, 1846; d. 19 Feb. 1910. Not long after entering the theatrical profession, he undertook in a stage emergency to fill the place of an actress, and his success in the humorous female rôle assumed led to his entering that line permanently. He acted in 'Josiah Allen's Wife' and in 'Widow Bedott.' The latter was very popular, as was also 'Vim,' produced in 1883. 'The Country Fair,' a play which he brought out in 1889, ran for more than two years. Mr. Burgess finally undertook vaudeville acting.

Burgess, a word used in somewhat varying senses, but generally meaning a freeholder, or a person invested with all the privileges of a citizen in a borough or corporate town. Those entered on the burgess roll of English boroughs are householders who have resided and paid rates for 12 months prior to July in any year. In the United States the uses of the word have undergone some specific changes, and in States having boroughs as political divisions,

as Connecticut, New Jersey, and Pennsylvania, it carries an implication of magisterial authority. See **BOROUGH**; **BURGH**.

Burgh, *bérg*, the same as *borough*. The spelling *borough* is the common one in England and the United States, while *burgh* is that which chiefly prevails in Scotland, as *Scarborough*, *Edinburgh*. A burgh of barony, in Scotland, is a certain tract of land created in a barony by the feudal superior, and placed under the authority of magistrates. A royal burgh in Scotland is a corporate body created by a charter from the Crown. There is a convention of royal burghs. In the United States the termination -borough was for generations added to the names of places, as in England; but, under a decision of the United States Board on Geographic Names, the form is now -boro, as *Brattleboro*.

Burgher, *bérg'er*, the name applied to a former subdivision of the Scottish Secession Church. The Secession, which originated through the withdrawal of Ebenezer Erskine and some other ministers from the Scottish establishment in 1732, split in two in 1747, part having felt free to take, while others refused, what they deemed an ensnaring burgess oath. They reunited in 1820 under the name of the Associate Synod, and, joining with the 'Relief' in 1847, formed the United Presbyterian Church.

Burgin, George B., English novelist and journalist: b. Croydon, Surrey, England, 15 Jan. 1856. He became private secretary to Baker Pasha and accompanied him to Asia Minor as secretary of the Reform Commission in Armenia. In 1885 he returned to England and was for a time sub-editor of 'The Idler.' Among his works are: 'The Dance at the Four Corners'; 'Tuxter's Little Maid'; 'The Judge of the Four Corners'; 'Tomalyn's Quest'; 'Fortune's Footballs'; 'The Cattle Man'; 'The Hermits of Gray's Inn'; 'The Bread of Tears'; 'The Tiger's Claw'; 'A Son of Mammon'; 'A Wilful Woman'; 'The Shutters of Silence.'

Burgkmair, Hans, *hants boork'mër*, German painter and engraver: b. Augsburg, 1473; d. about 1531. He is supposed to have been a pupil of Albert Dürer. Several of his frescoes and paintings in oil upon wood are still preserved in his native town; but though possessed of considerable merit, they have contributed far less to his fame than his woodcuts, in which he at least equaled Dürer, and has scarcely been surpassed by Holbein. Among his most famous works are the 'Triumph of the Emperor Maximilian I.' embracing 135 cuts, with a text written by that emperor; and a series, 'The Wise King,' including 237 cuts, in which the deeds of the same ruler are represented.

Burglary, at common law, the breaking and entering the house of another in the nighttime, with intent to commit a felony therein, whether the felony be actually committed or not. Burglary at common law, and in its first degree in the statutes of the various States, must, in general, be committed in a mansion-house actually occupied as a dwelling, but if it be left by the owner *animo revertendi*, though no person resides in it in his absence, it is still his mansion. But at common law burglary may be committed in a church. In New York (Penal Code

BURGLÉN — BURGOYNE

§ 496), and in some other States in which the New York statute has been adopted, burglary at common law, or in the first degree, must be committed in the night, but in New York and in some other States burglary in the second and third degrees may be committed in the daytime, and it is burglary in the third degree in New York feloniously to enter a building, whether inhabited or not, either in the daytime or night. Before the offense is complete there must be both a breaking and an entry or an exit. An actual breaking takes place when the burglar breaks or removes any part of the house, or the fastenings provided for it, with violence. Constructive breakings occur when the burglar gains an entry by fraud, conspiracy, or threats. The least entry, with the whole or any part of the body, hand or foot, or with any instrument or weapon, introduced for the purpose of committing a felony, will be sufficient to constitute the offense. Burglary is a felony in all of the States, and in North Carolina it may be punished with death or imprisonment. In New York it is punishable as follows: Burglary in the first degree, imprisonment for not less than 10 years; second degree, not exceeding 10 years; third degree, not exceeding 5 years.

Bürglen, a village of Switzerland, in the canton of Uri, about a mile from Altorf, is the traditional birthplace of William Tell. The supposed site of the patriot's house is now occupied by a chapel, erected in 1522, upon the walls of which are represented certain well-known scenes from his history.

Burgomaster, the title of the chief magistrate of a city or a large town in Germany and the Netherlands, practically equivalent to mayor.

Burgomaster, a sailor's name for certain large domineering gulls of the genus *Larus*.

Burgos, **Francisco Javier de**, frän-thës'kō hä'vër dë boor'gōs, Spanish statesman and poet: b. Motril, Granada, 1778; d. 1845. In his dramatic compositions he sought to restore the classical Spanish comedy. Among them are: 'The Three Equals'; 'The Masked Ball'; and 'The Optimist and the Pessimist.' He wrote a celebrated 'Ode to Reason.'

Burgos, a city of northern Spain, the capital of the province of Burgos, and formerly of Old Castile, and once the residence of its kings. It stands on the declivity of a hill, on the right bank of the Arlanzon. The streets are narrow and dark, the finest in every respect being that called the Huerto del Rey. Places of promenade are numerous; the one most frequented, and justly forming the boast of the town, being the Espolon. The most remarkable structure is the cathedral, one of the finest buildings of the kind in Europe. It was begun in 1221, but was not finished for several centuries. It is built of white marble in the form of a Latin cross, and is about 300 feet long by 200 broad, and its size is such that service can be performed in eight chapels at once without confusion. Its interior, as well as its exterior, is of great magnificence, is adorned with fine carvings and paintings, and contains numerous monuments, in particular the tombs of Don Fernando and the Cid, both natives of Burgos, and celebrated throughout Spain for their heroic achievements in the wars with the Moors. There are several other fine churches,

but the rest of the public buildings are not deserving of notice. The wool of Old Castile passes principally through Burgos, and it has some woollen manufactures. Burgos is the see of an archbishop, and at one time contained a university. Pop. about 31,400. The province of Burgos is bounded on the north by Santander, east by Alava, Logroño, and Soria; south by Segovia, and west by Palencia and Valladolid. The area is 5,650 square miles. Pop. about 340,000.

Burgoyne, **bër-goin', John**, English general and dramatist: b. 24 Feb. 1723; d. London, 4 Aug. 1792. He was the son of Capt. John Burgoyne, and grandson of Sir John Burgoyne of Bedfordshire, although reputed to be a natural son of Lord Bingley. Educated at Westminster, he entered the army at an early age, and while a subaltern eloped with Lady Charlotte Stanley, daughter of the Earl of Derby. By this alliance his military advancement was secured. After an election to Parliament in 1761, he served with distinction in Portugal, and was sent to America in 1775. He joined Gen. Gage at Boston, with large reinforcements, and witnessed the battle of Bunker Hill, of which he has left an animated description. After proceeding to Canada as governor, he returned to England, but in 1777 was despatched to take command of that expedition from Canada against the United States, the failure of which so largely contributed to the establishment of American freedom. Indeed, few battles have led in their ultimate influence to results so great as did the surrender of Burgoyne with 5,791 fighting men, well provided with artillery, at Saratoga, to the army of Gen. Gates. On his return home, he was received by the king with marked disfavor. Burgoyne did not possess the genius of a great general, and was in many respects utterly inadequate to the tasks imposed upon him, yet no one can read his work written in his own defense, 'State of the Expedition from Canada' (London 1780), without acknowledging his courage, and detecting qualities, which, in a less exalted station, might have been of much service to his country. Disgusted with his treatment by the government, he retired to private life, and devoted his leisure to the production of dramas, some of which, as 'The Maid of the Oaks,' 'The Lord of the Manor,' etc., were highly popular in their day. His best play, 'The Heiress,' has been successful not only in its original tongue, but also in several foreign versions. He was made commander-in-chief in Ireland in 1782, and in 1787 was one of the managers of the impeachment of Warren Hastings, whose trial lasted through several years after Burgoyne's death. See SARATOGA. BATTLES OF.

Burgoyne, **SIR JOHN FOX**, English officer of engineers: b. 24 July 1782; d. 7 Oct. 1871. He was the son of Gen. John Burgoyne; was educated at Eton and at the Royal Military Academy at Woolwich; entered the Royal Engineers in 1798; served at Malta in 1800, in Sicily with Gen. Stewart in 1806, in Egypt in 1807, and in the Peninsula with Sir John Moore and Wellington from 1809 to 1814. He shared in the celebrated retreat on Corunna, and was present at all the sieges, generally as first or second in command of the engineers, and at most of the battles of the Peninsular war,

BURGRASS — BURGUNDY PITCH

in which he was twice wounded. During the War of 1812, he assisted as lieutenant-colonel and chief engineer in the attack on New Orleans. In 1826 he accompanied the army of Gen. Clinton to Portugal in the same capacity. He was appointed chairman of the Board of Public Works in Ireland in 1830 and in 1845 became inspector-general of fortifications in England. He was made a lieutenant-general in 1851, and on the outbreak of the Crimean war was sent to Turkey to provide for the defense of Constantinople. After returning to England he was again sent out to Sebastopol, where he was chief of the engineering department till recalled in 1855. He received the order of the Medjidie from the Sultan of Turkey, was made a general in 1855, the following year was created a baronet, in 1868 a field-marshal, and for some years, up to his death, held the appointment of constable of the Tower of London. In 1859 a work was published in London under the title of 'Military Opinions of Gen. Sir J. F. Burgoyne,' in which many of his official writings were collected.

Burgrass. See SANDBUR.

Burgrave, a count who in the Middle Ages had command of a castle or burg. Burgraves were appointed to their office by the emperor or by the bishops; and belonged to the nobility by virtue of their office. Their powers differed in different places, but as a rule they were entrusted with keeping the public peace, the oversight of trade and the market, and the command of the troops and the police in their districts. As the free cities grew in power they were separated from the jurisdiction of the burgrave. The office lost its significance in the course of the 13th century, but the title is retained by some princely families to the present time, as, for instance, by the kings of Prussia who have the title of Burgrave of Nuremberg.

Burgundy, Louis (DUKE OF), Dauphin of France: b. Versailles, 6 Aug. 1682; d. 18 Feb. 1712. He was grandson of Louis XIV. and father of Louis XV. A boy of ungovernable passions and temper, great haughtiness of bearing, and sensuality of life, he is said to have been much corrected in character and conduct by the influence of his preceptor, the saintly Fénelon. At the age of about 15 he married Princess Adelaide of Savoy; was made generalissimo of the army in 1701; and on the death of his father became heir-apparent to the throne. He was called the Grand Dauphin, and from his relationship to two of the greatest sovereigns of France his figure gains a historical importance out of all proportion to that of his own personality and career.

Burgundy, a region of western Europe, so called from the Burgundians, a Teutonic people originally from the country between the Oder and the Vistula. They migrated to the region of the Upper Rhine, and in the beginning of the 5th century they passed over into Gaul, and after a long struggle obtained possession of the southeastern part of this country. Here they founded a kingdom, which had as its seat of government sometimes Lyons and sometimes Geneva; but having become engaged in a war with the Franks, they were at last wholly subdued in 534. More than one kingdom of Burgundy, so called, subsequently arose, as well

as the important county of Burgundy (Upper Burgundy, Franche-Comté); but the most important state of this name was the duchy of Burgundy (Lower Burgundy), consisting principally of the French province Bourgogne (Burgundy, properly so called). The long line of ancient Dukes of Burgundy became extinct in 1361 with the death of Duke Philip, and Burgundy was immediately united by King John of France with the French crown. The dignity of Duke of Burgundy was restored in 1363 by his grant of the dukedom to his youngest and favorite son, Philip the Bold (q.v.). In 1368 he married Margaret, the widow of the last Duke Philip of the old line, only daughter and heiress of Louis III., Count of Flanders, and thereby greatly augmented his possessions, which now included Flanders, Mechlin, Antwerp, and Franche-Comté. In 1402 he was made regent of France, an appointment which gained him the hatred of the king's brother Louis, Duke of Orleans, and led to the struggle between the Orleanist and the Burgundian factions. In 1404 Philip died, and was succeeded by his son, John the Fearless, who was stabbed by the companions of the dauphin in 1419. His son and successor, Philip the Good (q.v.) gained great accessions of territory, including Hainault, Holland, Zealand, Namur, and in 1431 Brabant and Limburg, which reverted to him from a younger branch of his family. In 1441 he also obtained the duchy of Luxemburg. On his marriage with his third wife, Isabella, daughter of King John of Portugal, he founded the order of the Golden Fleece. His son, Charles the Bold (q.v.), who succeeded him in 1467, became the inveterate enemy of Louis XI. of France, and one of the most powerful princes in Europe. He acquired Gueldres in 1475, but perished in the fatal battle of Nancy in 1477, leaving behind him a daughter, Maria, the sole heiress of his states. She married Maximilian of Austria, who thus obtained the Netherlands and Upper Burgundy. The king of France received the dukedom of Burgundy, which he assumed as a male fief. Henceforth the territories that had belonged to Charles shared the fortunes either of France or of the empire. In the empire what was called the circle of Burgundy for a time embraced Franche-Comté and the Netherlands. In the Peace of Madrid, in 1526, Francis I. was obliged to agree to the cession of the duchy of Burgundy to Charles V. of Germany, but the cession was never carried out, and in the Peace of Cambray, in 1529, Charles renounced his claim to it. Franche-Comté was conquered by Louis XIV., and retained by him at the Peace of Nimeguen in 1678. After this time the name Burgundy is best known as designating one of the provinces or governments of France.

Burgundy (called also Burgundy Proper, or Lower Burgundy), formerly a province in the east of France, lying on the west of Franche-Comté, and on the south of Champagne. It now forms the four departments of Yonne, Côte-d'Or, Saône-et-Loire, and Ain. It is one of the most productive regions in France. The principal product is wine. See BURGUNDY WINES.

Burgundy Pitch, the resinous exudation of the stem of the spruce fir (*Abies excelsa* or *Pinus abies*), melted and strained. It is ob-

BURGUNDY WINES—BURITI PALM

tained from Switzerland, but is seldom genuine. It is hard and brittle, opaque, of a dull reddish-brown color, empyreumatic odor, and aromatic taste. It gives off no water when heated, is not bitter, and is free from vesicles. It consists chiefly of resin and a little volatile oil, whence its odor. The resin resembles that of turpentine. Pitch plaster acts externally as a slight stimulant to the skin. Burgundy pitch enters also into the composition of the iron plaster. It takes its name from Burgundy in France, where it was first prepared.

Burgundy Wines, famous French wines, deriving their name from the ancient province of Burgundy. They have a reputation superior to their present popularity. They are nevertheless wines of delicious flavor and bouquet. It has been supposed that they would not well bear a sea-voyage, but it is now settled that when transported to America and back, their quality is greatly improved. The most renowned red wines of Burgundy are Romané-Conti, Clos-Vougeot, Chambertin, and Richebourg. Chambertin was the favorite wine of Louis XVI. and Napoleon. Chablis, a white wine, has many admirers, but is inferior to the best growths of the Garonne and the Rhone.

Burhānpur, *boor-han-poor'*, a town of the Nimar district, Central Provinces, British India, formerly the capital of Khandesh, is situated on the Tapi River, about 300 miles northeast of Bombay. It is situated on high ground, and is well planned and built. It has a mosque and other buildings worthy of note, and was once famous for its manufactures of gold and silver brocade, muslin, and silks, which still exist to some extent, though the town has long been declining.

Burhel. See **BAERAL**.

Buri, *boo'rê*, the grandfather of Odin, in Norwegian mythology. According to the legends 12 streams flowed from the spring Hvergelmir in Nifheim (the region of shadows), and later in their course were frozen, thus surrounding the region of elemental fire (Muspelheim) with blocks of ice. From this ice came the giant Ymir and the cow Audhumla; from the cow's udder came four streams of milk with which the giant was fed. Audhumla was nourished by licking the salt ice-blocks, and as she licked them a man's hair appeared on the first day; a man's head on the second day and the whole man on the third day; this was Buri. He was of giant size and strength; he had a son Bor through whom he was the grandfather of Odin, Vili, and Ve.

Burial, the ordinary method of disposing of the dead, a practice which varies among different peoples. Among savage races, and even among some civilized peoples of the East, exposure to wild animals or birds of prey is not uncommon. The careful embalming of the dead by the ancient Egyptians may be regarded as a special form of burial. But by far the most common forms of disposing of the dead have been burning and interring. Among the Greeks and Romans both forms were practised, though among the latter burning became common only in the later times of the republic. In this form of burial the corpse, after being borne in procession through the streets, was

placed upon a pyre built of wood, and profusely sprinkled with oils and perfumes. Fire was set to the wood, and after the process of cremation was complete the bones and ashes were carefully gathered together by the relatives and placed in an urn. With the introduction of the Christian religion, consecrated places were appropriated for the purpose of general burial, and the Roman custom of providing the sepulchre with a stone and inscription was continued by the Christians. The practice of cremation now declined and finally disappeared, but has recently to some extent been revived. See **BURYING-PLACES**; **CREMATION**; **FUNERAL RITES**; **MOUND BUILDERS**; **MUMMY**; etc.

Buriats, *boo-rê-âts'*, a Mongol people, forming a branch of the Kalmucks, and who submitted to the Russians in 1644. They inhabit the southern part of the government of Irkutsk and Transbaikalia, and number more than 200,000. They support themselves by their flocks, by hunting, and the mechanical arts, particularly the forging of iron. Their dress consists partly of leather. Their religion is partly Lamaism and partly Shamanism; and their idols are sometimes painted on cloth, and sometimes made of wood, metal, felt, and sheepskin.

Buridan, *Jean*, *zhôn bu-rê-dân*, French scholastic philosopher: b. Béthune, Artois, about 1300; d. after 1358. He studied at Paris, where he attached himself as a disciple of Occam to the party of the Nominalists, and at a later time became himself a teacher. In the end he was forced by his opponents to flee from Paris, when he betook himself to Vienna, where he is said to have been influential in bringing about the establishment of the university. Here also he wrote some logical and ethical treatises, in which he appears as a zealous adherent of the Aristotelian philosophy. Buridan was a supporter of the doctrine of Determinism (q.v.), and he is now chiefly known through having his name attached to an illustration that he is said to have used in support of his views, and known as "Buridan's Ass." He is said to have supposed the case of a hungry ass placed at an equal distance from two equally attractive bundles of hay, and to have asserted that in the supposed case the ass must inevitably perish from hunger, there being nothing to determine him to prefer the one bundle to the other. This illustration, however, is not found in any of his works, and from its nature it would appear more likely to have been used by the assailants of the doctrine of Determinism. He wrote 'Compendium Logicae' (1489), and other works.

Bu'rin, or **Graver**, the principal instrument used in copper engraving, is made of tempered steel, and is of prismatic form, the graving end being ground off obliquely to a sharp point. The distinctive style of a master is frequently described by such expressions as a soft burin, a graphic burin, a brilliant burin, etc.

Buriti (*bu-ri-tê'*) **Palm**, a lofty, fan-leaved palm (*Mauritia vinifera*), common in swamps in northern Brazil. It bears abundant crops of scaly nuts about two inches long, from the reddish oily pulp of which a confection is made by boiling with sugar. The nuts also yield an oil which is emulsified to make a popular drink. After the tree is felled numerous cup-like holes are made in the prostrate trunk.

These become filled with a reddish fluid, which is used as a beverage. Its taste resembles some sweet wines.

Burke, Edmund, political philosopher and orator: b. Dublin 12 Jan. (probably) 1729; d. Beaconsfield, England, 9 July 1797. He was the son of a solicitor in good practice. His mother was a Roman Catholic, but he and his two brothers adopted the religion of their Protestant father. Always, however, he was tolerant of Catholicism. At the age of 14 he entered Trinity College, Dublin, where he took his bachelor's degree in 1748. In this period, as his letters show, he had fits of enthusiasm over various studies—a *furor mathematicus*, succeeded by a *furor logicus*, a *furor historicus*, and a *furor poeticus*. The 17 years between 1748 and 1765, when his career was finally determined by his election to Parliament, he spent in different employments. Going to London with the intention of taking up law, he succumbed to the attractions of literature and philosophy. He travelled in England and on the Continent, frequented debating clubs and theatres, and did more or less hack work for publishers. He printed nothing, however, with which his name is connected till the two books of 1756: 'A Vindication of Natural Society' and 'A Philosophical Inquiry into the Origin of Our Ideas on the Sublime and Beautiful.' In the first he attempted to refute Bolingbroke's arguments against revealed religion by showing that they might be urged with equal force against the organization of society. In the second he took up a subject much discussed at the time; and though his speculations have been superseded, he has the credit of stimulating Lessing to the production of 'Laokoon.' Burke also wrote or helped to write an 'Account of the European Settlements in America' (1757), and an 'Abridgment of the History of England' (1758). In 1759 he began to edit the *Annual Register*, with which he was connected for 30 years. In 1761 he went to Ireland, attached in some indefinite way to William Gerard Hamilton—"Single-speech" Hamilton—who was secretary to the lord-lieutenant. After two years in Dublin he returned to England; there he joined the famous Literary Club, with which are associated the names of Johnson, Goldsmith, Sir Joshua Reynolds, and Garrick.

In recognition of his abilities and of the knowledge of politics which he had shown in the *Annual Register*, he was offered the post of private secretary to Lord Rockingham when the latter became prime minister in 1765. In the same year he was elected member of Parliament from Wendover. Within a week or two he made a strong impression with two speeches for the repeal of the Stamp Act. Upon the fall of the Rockingham ministry, Burke, who might have had a place with the new administration, remained with his friends. Turning to their account his literary powers, he began his series of great political tracts. In 1769 he put forth 'Observations on the Present State of the Nation,' a reply to a pamphlet by George Grenville. In this controversy Burke showed himself a master of the details of revenue and finance. At this time he took part in some transactions which afforded his enemies a handle against him. Though he had been living almost from hand to mouth till he entered

Parliament, he bought in 1768 an estate worth upwards of \$100,000. The underlying facts have never been determined with complete satisfaction. This much, however is clear: Burke lived on terms of intimacy with his brother Richard and a distant kinsman, William Burke. Richard and William, together with Lord Verney, a political patron of Edmund, speculated in stock of the East India Company, and later Richard was engaged in questionable dealings in West Indian lands. That these ventures were shared by Burke has been charged but never proved. On the other hand it can be shown that most of the money for the purchase of his estate he borrowed from Lord Rockingham. After getting the place, he had to borrow right and left to maintain it. Probably his faults were neither dishonesty in speculation nor venality in Parliament, but undue ambition to live as he thought became his position, carelessness and improvidence, and an adherence to eighteenth century standards of propriety, which in such matters were lower than ours.

Whatever his shortcomings in managing his private affairs, his services to the public were very great. He was on the side of the people in the long contest over John Wilkes. Since his sentiments on this subject were in general those of the 'Letters' of Junius, he was suspected of being Junius. This accusation he denied; and his 'Thoughts on the Cause of the Present Discontents' (1770) showed so many differences on minor points that—were no other evidence available—it must be concluded that Burke was not Junius. In the 'Thoughts' Burke argued that the king and a small knot of advisers were building up power for themselves; that powers of government are held in trust for the people; and that popular impatience must therefore be indulged. But, true to his conservative instincts, he would not accept the radical reforms commonly proposed—universal suffrage and the disfranchisement of "rotten boroughs." He would have changes more gradual. During the years immediately following 1770 Burke devoted his energies to keeping the Rockingham Whigs united against the efforts of the king to win them over. Without Burke, says John Morley, "the Rockingham connection would undoubtedly have fallen to ruin, and with it the most upright, consistent, and disinterested body of men then in public life."

From his political activity Burke withdrew for a time in 1773 for a trip to France. There he observed two things which he strongly dreaded: atheism and an eager questioning of the "allowed opinions which contribute so much to the public tranquillity." This atheism and speculation, he perceived—and he was one of the few who were so clear-sighted—were working toward revolution. His fear of these tendencies he expressed in Parliament not long after his return.

By this time Burke had won a substantial reputation throughout the United Kingdom. Indeed, as early as 1766 at least one Irish municipality had voted him the freedom of the city; and in succeeding years English mercantile organizations passed resolutions commending his labors in behalf of commerce. Finally in 1774, when troubles with America were thickening, Bristol, the trading centre of the west of England, a city which had everything to lose

and nothing to gain from a war with the colonies, elected him to Parliament. At the conclusion of the poll his colleagues had promised obedience to the instructions of his constituents. Burke, however, declared his independence: "Your representative owes you, not his industry only but his judgment; and he betrays you instead of serving you if he sacrifices it to your opinion." To this declaration he adhered when in 1778 a bill was proposed relaxing restrictions upon Irish commerce. The English merchants, including those of Bristol, protested; but Burke replied, "England and Ireland may flourish together. The world is large enough for us both. Let it be our care not to make ourselves too little for it." ('Two Letters to Gentlemen in Bristol.') For this liberality Burke was never forgiven, and in the election of 1780 he was forced to seek a new constituency.

It was during his six years as member for Bristol that, in the contest over America, he rose to his full height as a statesman. He was almost alone among the speech-makers of that time in always going below the superficial considerations of the moment to the fundamental fact that in the long run restraint and violence defeat themselves. In addition to many minor speeches scattered through the 'Parliamentary History' he made three great contributions to the subject: 'Speech on American Taxation,' 19 April 1774; 'Speech on Conciliation,' 22 March 1775; and 'Letter to the Sheriffs of Bristol,' 3 April 1777. In the first he argued that the tea duty was of no use to England for revenue; that it served only to irritate the Americans; and that by winning the loyalty of the colonists England would get more than she could ever take by force. In the second speech Burke maintained that England must conciliate, and that the only way was by yielding. In the 'Letter' he reviewed the struggle and in the light of events justified his own position. Of the three pieces that on 'Conciliation' is the best. Not even when dealing with India does Burke excel in grasp of details, in lucid presentation of a large mass of facts, and in ripened political wisdom. Then, too, he saw what so many failed to observe, that the real cause of the contest lay deeper than the casual orders of a governor or the retaliation of a mob; and that America, in resisting the encroachments of royal prerogative, was fighting a battle for the liberties of Englishmen at home.

Though Burke could not win over Parliament to his views on America, he had better success with his 'Speech on the Plan for Economical Reform' (1780). People were staggering under the debt from the American war and agitating for a general reform of Parliament. Burke opposed such radical changes; he proposed to abolish some offices, consolidate others, and reduce salaries. One of the offices which he reformed, that of paymaster of the forces, he himself occupied in 1782. At that time the North ministry yielded to the Whigs, who were temporarily united under Lord Rockingham, Charles James Fox, and Lord Shelburne. Burke, owing in part to infirmities of his temper and the suspicions against him, got only this third-rate position, instead of a place in the cabinet. The Whigs were scarcely in their seats when Lord Rockingham died and Lord Shelburne became head of the administration. At

once Fox and Burke refused to work with him, and by joining their old enemy Lord North, in what is known as the Coalition, they broke up the Whig party. Burke is accused of deserting his principles for purely personal motives. His conduct is hard to defend; for he attacked Shelburne with asperity, and under the Coalition resumed for a few months the office of paymaster.

Against this dubious course we may set his strenuous advocacy of reform in India. That country was victim of the corrupt and cruel system of the East India Company. Burke was familiar with the subject, for he had been a member of select committees on Indian affairs and had drawn two important reports. He is also supposed to have framed the East India bill commonly known as Fox's. At any rate he defended it: (1 Dec. 1783) in one of his best speeches. The bill, however, was defeated, and the Coalition, which supported it, driven from office. Early in 1785 Burke renewed the attack in his 'Speech on the Nabob of Arcot's Debts'—a preliminary to the proceedings against Warren Hastings. In 1786 Burke drew the articles against Hastings. The trial dragged on till 1795; and though the verdict at last was for acquittal, Burke had none the less succeeded in reforming the government of India; for he had trumpeted the wrongs of that "emptied and emboweled" land till public sentiment would no longer tolerate them.

Before the trial of Hastings had closed, the French Revolution had broken out. Burke looked upon it, not as the emancipation of oppressed masses, but as an effort of atheists and political theorists to uproot the settled order. Since his views were hostile to those of the more radical Whigs, he began to draw away from the men with whom he had been allied against the encroachments of the crown in England and America. In 1790 he widened the breach still further by aggressive proclamation of his opinions in 'Reflections on the Revolution in France.' The book had for that day an enormous sale and divided Great Britain into two parties: one composed of Burke and an uncongenial company of Tories; the other of liberals, many of whom had been Burke's lifelong associates. Burke himself violently quarreled with his old friend Fox. The seeming contradiction between his early position and his later is accounted for in part by the fact that he grew more conservative with age, in part by his desire to preserve the balance between monarch and subject. In England the crown had been the aggressor; in France, he thought, the people. Moreover, he had always insisted that liberty is "inseparable from order"; and in France he saw nothing but disorder. As the Revolution progressed, Burke became more and more wrought up, so that in each of his succeeding utterances—'Letter to a Member of the National Assembly' (1791), 'Appeal from the New to the Old Whigs' (1791), 'Thoughts on French Affairs' (1791), 'Remarks on the Policy of the Allies' (1793), 'Observations on the Conduct of the Minority' (1793), and 'Letters on a Regicidal Peace' (1796)—the reasoning grew feebler, the scolding shriller.

During the same period, when Burke was dealing with a subject on which he was more thoroughly informed, Ireland, he showed his old qualities of statesmanship. He had always been

BURKE

a champion of his down-trodden native land. When Ireland caught the contagion of the French Revolution, and when the war between England and France made Ireland still more restless, Burke urged for Ireland the same policy of conciliation that he had urged for America. In letter and pamphlet he unceasingly advocated relieving the Catholics of their political disabilities.

In 1794 he retired from Parliament. He was to have received a peerage with the title Lord Beaconsfield; but since the death of his son left him without direct male heir, he accepted instead a pension. This was the occasion of a fresh attack upon him by his enemies. He replied effectively in the 'Letter to a Noble Lord' (1796).

His zeal in behalf of the wretched and the oppressed was not a mere vague sentiment; it was a motive in his daily conduct. When the poet Crabbe was obscure and penniless Burke took him into the family, found a printer for his verses, and finally obtained for him a living in the Church. At the time of the Revolution Burke also kept open house for French refugees and established a school for their children. Burke's principles of statesmanship, when briefly set down, seem very bald and simple. The basis of his system is explained in a sentence from one of his letters: "The principles of politics are those of morality enlarged." The first of the moral laws upon which he rested great weight was justice; the second, generosity. Knowing that perfect justice could never be obtained, that human institutions are at best compromises, he was not a theorist, he did not fall into the fallacy that the machinery of government may be constructed as if men were uniform, passive units. These phases of his bent for the practical are in the last analysis a trust in experience. A man who clings so tenaciously to experience is likely to be an uncompromising conservative; and Burke was for his generation and all generations since, the "great pleader for conservatism." As an orator he frequently produced no immediate effect. His gestures were clumsy, and when he spoke in public his voice was somewhat harsh, he dropped into a strong Irish brogue, and at times a hurried articulation. But, above all, he overestimated the capacity of his hearers. Not content with a concise presentation of leading points, he insisted on applying profound philosophic principles. Yet some of his speeches, notably at the trial of Warren Hastings, produced a profound effect. This effect was largely due to the vigor of his style as a writer. He was virile, vivid in description, and unsurpassed in lucid and logical arrangement of material.

In the winter of 1756-1757 he married Jane Nugent, daughter of a physician. Her capacity for management lifted many burdens from his shoulders. His only child, a son, Richard, died in 1794.

Among his important writings or speeches not already mentioned are 'Address to the King' (1777), 'Letter to Sir Hercules Langrishe' (1792), 'Thoughts and Details on Scarcity' (1795).

Bibliography.—There are in the market three or four editions of Burke's writings and speeches, substantially complete. The best short life is in the 'Dictionary of National Biography.'

John Morley's *Life of Burke* (1879) in the English 'Men of Letters' is excellent; also his 'Burke, a Historical Study' (1867). Of the earlier lives James Prior's (2d. ed. 1826) is the best. Of course Burke bulks large in the standard histories and memoirs of England in the 18th century.

HAMMOND LAMONT,
Editor New York Nation; Editor 'Burke's Speech on Conciliation with America.'

Burke, Jane, better known as CALAMITY JANE; American army scout and mail carrier: b. Princeton, Mo., 1852; d. Deadwood, S. D., 1 Aug. 1903. She was reared on the plains and early became an Indian scout, and was an aide to Gen. Custer and Gen. Miles in numerous campaigns. For several years she was the government mail carrier between Deadwood, S. D., and Custer, Mont.

Burke, John, Irish genealogist: b. near Parsonstown, Ireland, 1786; d. Aix-la-Chapelle, 27 March 1848. His life was devoted to genealogical research. In 1826 he began to publish a 'Genealogical and Heraldic Dictionary of the Peerage and Baronetage of the British Empire' and subsequent works by him were: 'A Genealogical and Heraldic History of the Commoners of Great Britain and Ireland' (1833-8), which in subsequent editions appeared as 'A Dictionary of the Landed Gentry.'

Burke, Sir John Bernard, English herald and genealogist; son of John Burke (q.v.): b. London, 1815; d. Dublin, 13 Dec. 1892. He was educated at Caen in Normandy, was trained as a lawyer and called to the bar in 1839. Besides editing the successive issues of the 'Peerage' founded by his father (49th ed. 1887), he published other works on the 'Landed Gentry' (1846); 'Extinct Peerages' (1846); 'Anecdotes of the Aristocracy' (1849); 'Family Romance' (1853); 'The Vicissitudes of Great Families' (1859); 'The Rise of Great Families' (1873); 'The Book of Precedence' (1881); and 'Reminiscences' (1882).

Burke, Maurice Francis, American clergyman: b. Ireland, 5 May 1845. He came to the United States in childhood and was educated in Chicago and Notre Dame, Ind., and in the American College, Rome, where he was ordained to the Roman Catholic priesthood in 1875. Returning to the United States, he took charge of a parish in Joliet, Ill. In 1887 he was consecrated bishop of Cheyenne, Wyo., and in 1893 was transferred to the see of St. Joseph, Mo. Bishop Burke is known as a fine linguist.

Burke, Robert O'Hara, Australian explorer: b. county Galway, Ireland, 1820; d. Australia, 28 June 1861. After serving in the Austrian army he went to Australia, and after seven years' service as inspector of police was appointed commander of an expedition to cross the continent of Australia from south to north. He and his associate, Wills, reached the tidal waters of the Flinders River, but both perished of starvation on the return journey. They were among the very first white men to cross the Australian continent from south to north.

Burke, Thomas Martin Aloysius, American clergyman: b. Ireland, 10 Jan. 1840. He came in childhood to Utica, N. Y., and was educated in Toronto and Baltimore and was ordained to the Roman Catholic priesthood in

BURKE — BURLINGTON

1864. He was appointed to labor in Albany and became successively vicar-general and administrator. In 1894 he was consecrated bishop of Albany.

Burke, Thomas Nicholas, Irish clergyman and orator: b. Galway, 1830; d. 1883. He was educated in Italy, where he entered the Order of St. Dominic. Going to England, he preached in that country and later in Ireland, gaining a high reputation as an orator and becoming familiarly known as "Father Tom." In 1872 he made a visit to the United States and lectured in reply to Froude, his addresses appearing in print under the title of 'English Misrule in Ireland.'

Burke and Hare, two miscreants, of whom William Burke, a native of Ireland, was detected, tried, and executed at Edinburgh, in 1829, for the murder of numerous individuals, his accomplice, Hare, escaping the hangman by turning king's evidence. At this time the "resurrectionists" were busy at their nefarious trade, but the vigilance with which the burying-grounds throughout the country were watched rendered a supply of subjects for anatomical schools almost impracticable, and the demand for dead bodies consequently became great. This led Burke and Hare to murder, by suffocation, many poor waifs who were decoyed into Hare's lodging-house, and whose bodies they sold to Dr. Robert Knox, proprietor of an anatomical theatre in Edinburgh. The case of Burke and Hare brought home to the public mind more clearly than ever how necessary it is that schools of anatomy should receive a regular supply of subjects for dissection, and in 1832 an act was passed for supplying the anatomical schools throughout the kingdom from the unclaimed dead in the hospitals.

Bürkel, Heinrich, hīn'rix būr'kēl, German painter: b. Pirmasens, 30 March 1813; d. Munich, 10 June 1869. He was educated at Munich and in Italy; he is chiefly a genre painter; his scenes from the Bavarian and Tyrolean Alps were among the first of their kind, and his village and tavern scenes rank among the best in modern art. Among his paintings are 'Scenes in an Inn' and 'Winter Scenes in the Tyrol.'

Burkitt, Francis Crawford, English Biblical scholar: b. London, 3 Sept. 1864. He was graduated at Trinity College, Cambridge. He has published 'Early Christianity Outside the Roman Empire' (1899); 'Fragments of Aquila' (1897); 'The Rules of Tyconius' (1894); 'Two Lectures on the Gospels' (1900); etc.

Burleigh, bér'li, George Shepard, American writer, brother of William H. Burleigh (q.v.): b. Plainfield, Conn., 26 March 1821; a. Providence, R. I., July 21, 1903. He has published 'The Maniac and Other Poems'; 'Signal Fires on the Trail of the Pathfinder.'

Burleigh, William Cecil (Lord), English statesman: b. Bourn, Lincolnshire, 13 Sept. 1520; d. London, 4 Aug. 1598. He was secretary of state under Edward VI. and Elizabeth, and prime minister of England for 40 years. In 1588 Parliament was assembled, and, by his advice, a plan of religious reform was laid before it. In this he had a considerable share; and he also took the leading part in the establishment of the Thirty-nine Articles of faith, which form the basis of the reformed religion

of the State. To him is also due the regulation of the coinage, which had been altered since Henry VIII.'s time. He was created Baron Burleigh in 1571, and, in 1588, concluded an advantageous treaty with the Netherlands. His policy was both cautious and comprehensive and he was entirely unaffected by personal prejudices in his management of public affairs. Consult: Nares, 'Memoirs of Lord Burghley' (1828-31); Charlton, 'Life' (1847); Hume, 'Great Lord Burleigh' (1898).

Burleigh, William Henry, American poet: b. Woodstock, Conn., 2 Feb. 1812; d. Brooklyn, N. Y., 18 March 1871. Bred on a farm, at 16 he became apprentice to a clothier, then to a village printer, and continued to labor in various places as journeyman printer, and finally as editor. In the latter capacity he had charge of the 'Literary Journal' at Schenectady, the *Christian Witness*, at Pittsburg, and the *Washington Banner*, in which papers, and in others, he published many short poems. A collection of them was published in 1840.

Burlesque, the comic effect arising from a ludicrous mixture of things high and low. High thoughts, for instance, are clothed in low expressions, or noble subjects described in a familiar manner, or *vice versa*.

Burlingame, Anson, American diplomatist: b. New Berlin, N. Y., 14 Nov. 1822; d. St. Petersburg, Russia, 23 Feb. 1870. After graduating from the Harvard Law School in 1847 he practiced law in Boston, and entering politics was active as a Free Soil advocate in 1848, and in 1854 was sent to Congress as a representative of the American Party. His vigorous denunciation of the assault upon Senator Sumner by Preston Brooks brought him a challenge from the latter, which was accepted, but Brooks declined to travel to the rendezvous in Canada. In 1861 he was sent as minister to Austria but was not received by the Austrian government on account of his advocacy of Hungarian independence. He was minister to China 1861-67, and in the last-named year was appointed ambassador from China to the United States and various European governments. On 4 July 1868 he concluded the noted 'Burlingame Treaty' which gave reciprocal privileges to China and the United States. After concluding treaties between China and Denmark, Sweden, Holland and Prussia, he died while arranging a treaty between China and Russia.

Burlingame, Edward Livermore, an American editor, son of Anson Burlingame (q.v.): b. Boston, 30 May 1848. He studied at Harvard and acted as private secretary to his father, who was United States minister. Since 1879 he has been associated with the publishing house of Charles Scribner's Sons, and in 1886 became editor of 'Scribner's Magazine.'

Burlington, England. See **BURLINGTON**.

Bur'lington, Iowa, a city and county-seat of Des Moines County, on the west bank of the Mississippi River at the intersection of the Chicago, Burlington, and Quincy, and several other lines of railroad. Its industries include the manufacture of machinery, furniture, agricultural tools, flour, linseed oil, soap, and many other articles, and extensive railroad shops are situated here. The city contains among it

BURLINGTON — BURMA

important buildings an opera house, court-house, city hall, hospitals, public library, schools of various kinds, and Burlington Institute College. Crapo Park, containing 100 acres, is in the southern part of the city. Burlington is one of the cities of Iowa having the commission form of government. It was named for Burlington, Vt. Its earliest buildings were built in 1833 and from 1837 to 1840 it was the State capital. Pop. (1910) 24,324.

Burlington, N. J., a city and port of entry in Burlington County, on the Delaware River and the Pennsylvania R.R.; 18 miles northeast of Philadelphia. It is a manufacturing trade centre for surrounding towns, and contains St. Mary's Church, endowed by Queen Anne; St. Mary's Hall, the oldest Church school for girls in the country; the State Masonic Home; Burlington College, and many fine old residences; and has manufactories of shoes, stoves, iron pipe, terra-cotta, and canned goods. The city was settled in 1677, by Friends, under the name of New Beverly. The name was subsequently changed to Bridlington, in honor of the Yorkshire town of that name on the North Sea, commonly called Burlington, and the spelling was presently made to accord with the pronunciation. The city was for many years the seat of government of West Jersey; and was the residence of the last colonial governor, William Franklin. It was bombarded by the British in 1776. Pop. (1910) 8,336.

Burlington, Vt., a city, port of entry and county-seat of Chittenden County, on Lake Champlain and the Central V. and Rutland R.R.'s; 40 miles northwest of Montpelier. It has a very large lake commerce and manufactories of lumber, cotton, and woolen goods, and iron. The environment is agricultural. The city is the seat of the State University of Vermont and of the State Agricultural and Medical colleges; Bishop Hopkins Hall; the Roman Catholic Cathedral; the Fletcher, Billings, and Burlington Law libraries; a county court-house; United States government building, and a Young Men's Christian Association Hall. Burlington is noted for its benevolent and educational institutions, which include the Mary Fletcher Hospital, Home for Aged Women, Home for Friendless Women, Home for Destitute Children, Adams Mission House, Louisa Howard Mission, Providence Orphan Asylum, Cancer Relief Association, Lake View Retreat, several sanitariums, the Vermont Episcopal Institute, St. Joseph's and St. Mary's academies (Roman Catholic), and high and graded schools. The city was settled in 1773; was a garrisoned post during the War of 1812; and was incorporated in 1865. Its material development has been largely due to its great lumbering industries. The famous Col. Ethan Allen is buried beneath a handsome monument in Greenmount Cemetery. Pop. (1910) 20,463.

Burlington Limestone, a limestone of sub-Carboniferous age, named for its occurrence near Burlington, Iowa. It is also found in other parts of the Mississippi valley. This limestone is of light color and fine-crystalline, resembling lithographic stone. It has important industrial value.

Bur'ma, the largest province of British India. It is on the east side of the Bay of Bengal, and at one time formed the greater portion of a

native kingdom or empire, which is said to have extended from lat. 9° to 26° N., and from lon. 92° to 104° E., its greatest length being about 1,000 miles, and its breadth 600; its area being then about 270,000 English square miles. But in 1826 the provinces or divisions of Arracan and Tenasserim were wrested from it by the British, and in 1852 Pegu and the province of Martaban shared the same fate. This portion was then known as British Burma, and continued to be so till in 1886 the rest of the kingdom was annexed by Great Britain, when the two portions came to be designated Upper and Lower Burma respectively. They now form together one province under a lieutenant-governor and legislative council. The area of Lower Burma is 87,957 square miles. It is to a large extent mountainous in character, the only extensive level being in Pegu, where the valleys of the Irrawadi and Sittaung form an alluvial tract of about 10,000 square miles. The rainfall varies from less than 60 inches in some places to 190 or more in others. About half the soil is believed to be cultivatable, but a comparatively small portion is as yet under cultivation, though agriculture is extending year by year. Since the occupation of the country by the British it has rapidly increased in prosperity, and the revenue is generally greater than the expenditure. The imports and exports together exceed \$50,000,000, the bulk of the trade being with Great Britain. The capital and principal port is Rangoon. Other towns are Moulmein, Akyab, and Bassein. Upper Burma has an area of 83,473 square miles, and is on the whole similar in character to Lower Burma, but less productive, and has generally a smaller rainfall. It is rich in minerals, including gold, silver, precious stones, marble, iron, lead, tin, antimony, arsenic, sulphur, and petroleum. Only a few of these are worked. The chief precious stones are the ruby and the sapphire; amber and jade are also found. All precious stones used to be sent to the royal treasury and strangers were prohibited from approaching the places where they were found. These districts are still the subject of special regulation under the British rule. The whole country is intersected by numerous streams, which, following the direction of the chief mountain chains, flow generally south to the Indian Ocean. The chief of these are the Irrawadi, the Salween, and the Chindwin, which joins the Irrawadi, the combined stream being of great volume. The Irrawadi is of great value as a highway of communication and traffic, being navigable beyond Bhamo, near the Chinese frontier. In their upper courses the rivers flow through narrow valleys; in their lower courses they traverse low-lying districts, and in the rainy season often overflow their banks. Among the wild animals of the country are the elephant, rhinoceros, tiger, leopard, deer of various kinds, and the wild hog. The rivers abound with fish. Of domestic animals we may mention the ox, buffalo, horse, elephant, and cat. In the southern districts, owing to the numerous rivers, the soil is most productive. Here grow rice, sugar cane, tobacco, cotton, indigo, and all the tropical fruits. Tea is cultivated in many of the more elevated parts. The forests produce timber of many sorts, including teak. A great part of the trade of the country is carried on by means of the Irrawadi River. From Bhamo

BURMA

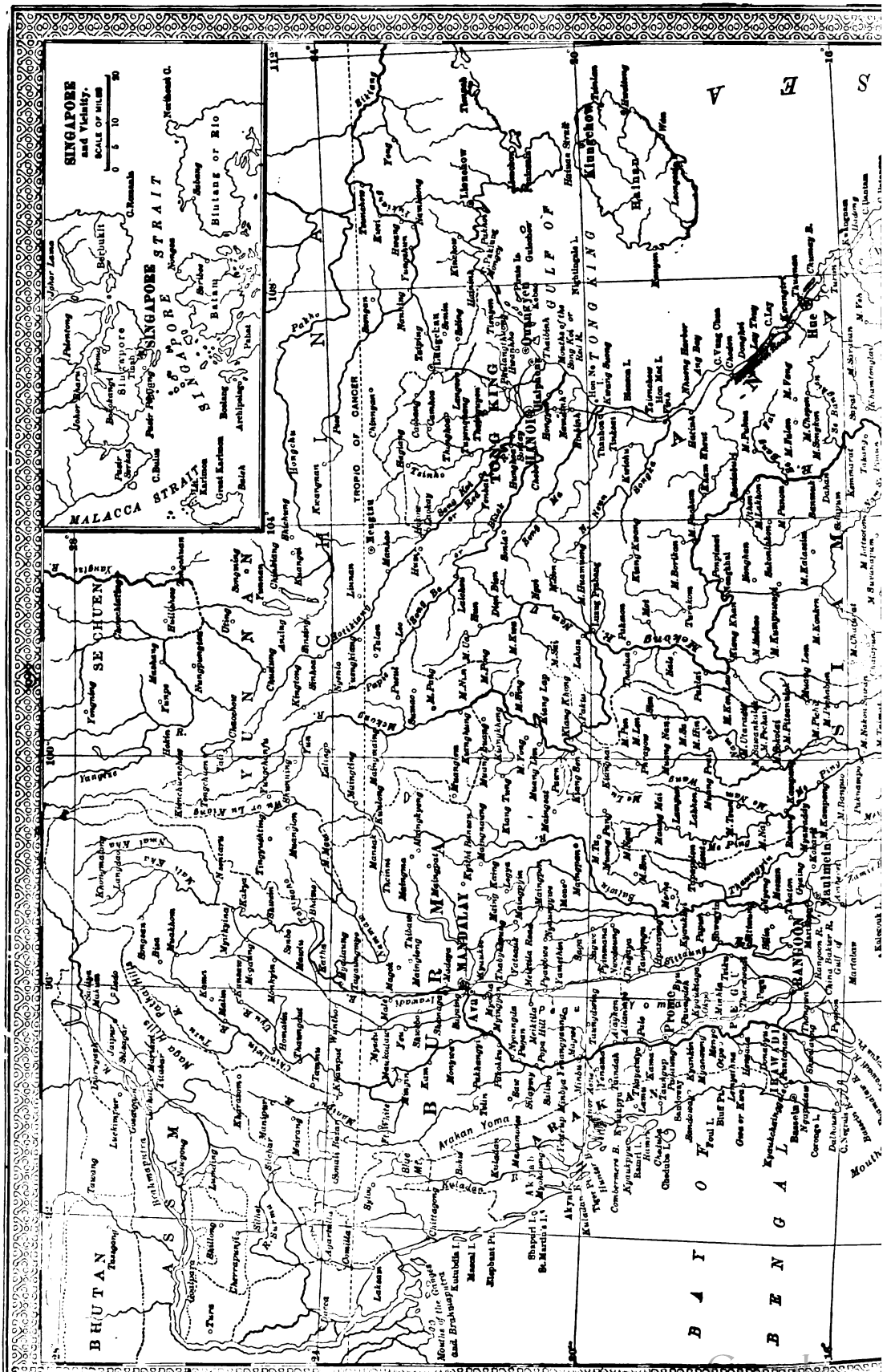
goods are conveyed to China, and this branch of trade is believed to be capable of great development. Rice is the great crop (occupying about 80 per cent of the cultivated area), and this grain forms the chief export, others being teak, cotton, and silk stuffs, petroleum, salt-petre, paper, and lacquer ware. Railways have been introduced, and the number of miles open is now about 1,000. From Rangoon two lines proceed north, one along the left bank of the Irrawadi to Prome and Meaday, the other through the Sittaung valley to Mandalay, and from that on the other side of the Irrawadi to Bhamo and Mogaung.

The Burmese have many skilful weavers, smiths, sculptors, workers in gold and silver, joiners, etc. Among industrial establishments are rice-mills, saw-mills, a few works for iron goods, ship-building yards, cutch works, etc. Other industries include boat-building, weaving, pottery, lacquerwork, and brasswork. The weaving of cotton and silk goods is carried on by the women everywhere. The pottery of the country is strong and durable, if not especially artistic; and the gold and silver work finds numerous purchasers outside the country. Wood-carving is extensively practised for the adornment of houses, boats, etc. The native vessels plying on the Irrawadi and other rivers are often of 100 to 150 tons burden, while thousands of small craft are engaged in trade or fishing. Large numbers of good cigars are made by women, and are partly used in the country, partly exported. The buildings among the Burmese are very slight, as the government used to require them to be chiefly of wood or bamboo, and prohibited the use of stone or brick except for pagodas, and other important structures.

People.—The Burmese are divided into several tribes, and belong to the common Indo-Chinese stock. Among the tribes other than the Burmese proper are the Karens, Kakhyens, Shams, etc. The Burmese proper are of a brown color, with lank, black hair, and vigorous, well-proportioned frames. No Burmese can have more than one wife; but he may have as many mistresses as he will. The latter live in the same house with the wife, and are her servants. The Burmese women enjoy a good deal of freedom; are not shut up as in some parts of the East, and can even engage in a lawsuit in their own name. The chief amusement of the Burmese is their theatre, where declamation, dancing, and music are given by turns. The new year (which begins in April) is celebrated with what is known as the "water feast," when young men and women throw water on each other and the passers-by. The Burmese usually write on palm leaves with an iron style or on black tablets with a pencil; the rich have libraries, with books, the leaves of some of which are thin pieces of ivory, with gilt edges. Their materia medica is chiefly confined to herbs, spices, and mercury; with vaccination they have long been acquainted. The language is monosyllabic, like Chinese, and written with an alphabet (derived from India), the characters of which are more or less circular. Among the common people the principal part of the male dress consists of a double piece of cloth about five yards long, loosely wrapped about the body. Over this a frock is worn, with sleeves open in

front, and reaching below the knees. The lower classes of women wear only a single garment, resembling a sheet, wrapped round the body and fastened under the arms. Men of rank wear a long robe of flowered velvet or satin, with open sleeves and collar, a mantle or scarf being thrown over this. On the head is worn a high velvet or silk cap, plain or embroidered, according to rank. The men wear earrings, often of large size. Women of the higher classes generally wear a shift which reaches only to the pit of the stomach, where it is drawn tight and fastened by strings. This is covered by a loose jacket, with tight sleeves. A piece of silk or cloth encircles the waist and descends to the feet. When a woman wishes to be particularly fine she stains her nails and palms a red color, and tinges her teeth and the edges of her eyelids with black. Both sexes wear the hair long; the men tying it in a knot on the crown of the head, the women on the back. Sandals are often worn, but neither boots, shoes, nor stockings; every man, woman, and child, however, carries an umbrella. The chewing of betel and smoking of tobacco are universal. The Kakhyens or Singto are a courageous people inhabiting the upper basin of the Irrawadi above Bhamo. They practise a sort of nature worship, and are active as traders, though at present rather lawless. Their villages are ruled by hereditary chiefs. The Chinese from Yunnan have of late years settled in considerable numbers as traders and agriculturists in the Kakhien country; and in Lower Burma they are now a highly important element in the population as traders and otherwise. In the hilly districts of Tenasserim and Pegu we find the Karens, a somewhat secluded people, less intelligent and more ignorant than the Burmese, and not so purely Mongolian in physical character. The Talaings or Mons of the Irrawadi delta resemble the Burmese, but speak a distinct language. The Shans are a numerous people closely allied to the Siamese, and inhabiting eastern and northeastern Burma, together with portions of the neighboring countries.

The native government was an absolute monarchy, the king having unlimited power over life and property. The seat of government, after oscillating between Ava and Amarapura, was latterly fixed in Mandalay, a new town founded in 1857, and situated in a dusty plain a little over two miles from the left bank of the Irrawadi, and about 28 miles northwest from Amarapura. The king was assisted in governing by a council of state known as the *Hloot-daw*, to which belonged at once the functions of a legislature, a cabinet, and a supreme court of justice. It was composed of officials of 14 grades, the president being the king himself, some other member of the royal family, or the prime minister. The king had power to punish at his pleasure anyone, including even the great officers of state. The public revenue was derived from taxes levied in a very irregular and capricious manner, and as the officials received no fixed salary corruption and oppression were extremely prevalent. The criminal laws were barbarously severe. Capital punishment was commonly inflicted by decapitation, but crucifixion and disemboweling were also practised. Torture might be applied to principals or witnesses; and trial by ordeal was not unknown. The





BURMA

standing army was small. Levies were made, in case of war, by way of conscription; and a specified number of houses was required to furnish a soldier or pay a fine. The religion of the country is that of Buddha, which is said to exist here in great purity. The tutelary divinities worshipped in various Buddhist countries are unknown, and the vows of poverty and chastity taken by the monks are said to be less frequently broken here than elsewhere. The Burmese possess a complete system of education, so far as male children are concerned. All boys are required to reside in a religious house for three years, and there they act as servants to the priests, who instruct them in reading, writing, and arithmetic, as well as the doctrines of their religion. The census of 1901 returned a population of 9,184,121, of whom 88.6 per cent were Buddhists, the density per square mile being 55, against 184 for India. Upward of 90 per cent of the population dwell in rural areas, and no tendency toward gravitation to the towns is observed. Although population has been steadily increasing in Burma the fact that an enormous tract of country not previously enumerated was now included in the census operations renders any comparison with the figures of 1891 misleading. Within Burma proper, however, an increase of over 19 per cent is found to have occurred, and a birth-rate of over 38 per mile compares not unfavorably with average European standards. Notwithstanding the fact that the social position of women is so assured in Burma and that there is no suspicion of the existence of female infanticide, women number only 962 in 1,000, against 1,006 and 1,022 in Bengal and Madras. But the explanation probably lies in the preponderance of the male element among the numerous immigrants into the province. Marriage in Burma is a purely secular ceremony, and elementary education is far more widely dispersed than in India, one individual in five being able to read and write.

History.—The Burmese empire is of little note in ancient or general history. Buddhism and civilization are said to have been introduced from India. The last native dynasty was founded by a Burmese called Alompra, a man of obscure birth, who defeated the Peguans, and in 1753 obtained possession of Ava. Having made himself master of Burma, he invaded Siam; but, during this invasion he died suddenly in 1760. Alompra ruled well and wisely, and Namdogee, his eldest son and successor, who died in 1764, inheriting his father's spirit, introduced various reforms and useful measures. Shembuan (Tshen-bo-yen), the emperor's brother, became regent as guardian for his nephew Momien; but he usurped the throne himself and conquered Siam. In 1771, however, Siam recovered its independence, while the principal part of the Burmese forces were engaged in a war with China. In this war they were victorious, and compelled the Chinese whom they took prisoners to intermarry with Burmese females, and to remain in their territory. In 1776 Shembuan left his empire, much enlarged, to his son, Chenguza. This prince lived in the unrestrained indulgence of every appetite till in 1782 he was dethroned and put to death. In consequence of the revolution, Mentaragyi, the fourth son of Alompra,

ascended the throne. He ordered his nephew, Momien, who was a state prisoner, to be drowned, and in 1783 subdued the kingdom of Arracan. He then engaged in a war with Siam, which continued till 1793, when peace was made on certain conditions. About this period, it happened that some robbers fled from the Burmese empire, and took refuge in the territory of the East India Company. The Burmese demanded that they should be delivered up, and on their demands not being immediately complied with, marched with a strong force into the offending country. At the same time they carried on a friendly negotiation with the government in Calcutta, which resulted in the surrender of the criminals, and the conclusion of a treaty of amity and commerce between the two governments, negotiated by Capt. Symes. The last victory of the Burmese was in 1822 over the province of Assam. The party driven from Assam, together with the Burmese rebels, fled to the British territories, whence they intended to invade Burma. The British government disarmed the insurgents, but refused to deliver them up or to drive them from the island of Shapuri, which they had occupied. At length the Burmese sovereign demanded of the government at Calcutta the cession of northern Bengal as being a part of Ava, and in January 1824 his forces marched into Cachar, which was under British protection. Lord Amherst, as governor-general of the British East Indies, now declared war against Burma, and Gen. Archibald Campbell prosecuted it so successfully that after the victory at Prome (1-3 Dec. 1825), he obliged the monarch to conclude a peace at Palanagh in 1825. As the treaty was not ratified on the part of the Burmese emperor by the time specified (18 Jan. 1826), Campbell renewed the war and stormed the fortress of Munnum. On 24 February the peace was ratified, and the war concluded with the cession of Arracan, Mergui, Tavoy, etc. In 1852 a second war broke out at the conclusion of which Rangoon and the whole of Pegu fell into the hands of the British. About 1860 the new city Mandalay supplanted Amarapura as the capital. In 1867 British steamers were permitted by treaty to navigate Burmese rivers, and not long after traffic was carried on up the Irrawadi as far as Bhamo. In 1885 the outrageous proceedings of King Theebaw provoked another war, and a British force proceeded from Rangoon up the Irrawadi River, took Mandalay, and sent King Theebaw a prisoner to Rangoon. On 1 Jan. 1886, Theebaw's dominions were annexed to the British empire by proclamation of the viceroy of India (the Earl of Dufferin). After the annexation there was a considerable amount of scattered fighting with dacoits and others, but the country is now comparatively quiet, is being opened up to commerce, and is rapidly advancing in prosperity. In 1897 Burma was constituted a province, and placed under a lieutenant-governor instead of a chief-commissioner.

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turesque *Burma, Past and Present* (1897); Ferrar, *Burma* (1898); Harmer, *The Story of Burma* (1901).

Burmeister, Hermann, hër'män boor'mis-tër, German scientific writer: b. Stralsund, 15 Jan. 1807; d. Buenos Ayres, Argentina, 2 May 1892. He distinguished himself as a geologist and zoologist in his native country, and settled permanently in Argentina, where he continued his investigations. *Manual of Entomology*; *History of Creation* (1843); and *The Fossils of Horses Found Among the South American Pampas* (1875), are among his books.

Burmeister, Richard, German-American musical composer: b. Hamburg, Germany, 7 Dec. 1860. He received an academical education in Hamburg; studied with Franz Liszt, and in Rome, Budapest, and Weimar; made concert tours in Europe in 1883-5 and in the winter of 1893; was at the head of the piano department of Peabody Institute, Baltimore, Md., 1885-97; and settled in New York in the latter year. He made concert tours all over the United States and was director of the Scharwenka Conservatory, New York, in 1897-9. He has composed *'The Sisters'* (a dramatic tone poem), numerous songs, and piano, violin, and orchestra pieces; and arranged Liszt's *'Concerto Pathétique'*, originally for two pianos, for the piano and orchestra.

Burnaby, Frederick Gustavus, English soldier and traveler: b. Bedford, England, 3 March 1842; d. 17 Jan. 1885. He was educated at Bedford and Harrow, and entered the Royal Horse Guards in his 18th year as cornet. In 1861 he became lieutenant, in 1866 captain, major in 1879, lieutenant-colonel in 1880, and finally, in 1881, was appointed colonel, a rank which he held till his death. In 1875 he made his famous ride to Khiva—a journey that presented great difficulties. During the ride, which he undertook partly because he had learned that the Russian government kept Europeans out of central Asia, he suffered severely from the intense cold prevailing at the time when he crossed the steppes. In 1876 he rode through Asiatic Turkey and Persia. Of both these journeys he published narratives, namely, *'Ride to Khiva'* (1876, 11th ed. 1877, new ed. 1884), and *'On Horseback Through Asia Minor'* (1877). While serving as lieutenant-colonel of the Royal Horse Guards in the Egyptian campaign, he was killed at the battle of Abu-Klea.

Burnand, Sir Francis Cowley, English author: b. 29 Nov. 1837. He was educated at Eton and Trinity College, Cambridge, and at first studied with a view to entering the Church of England, but when in 1858 he became a Roman Catholic he devoted himself to legal studies, and was called to the bar in 1862. By that year he had already achieved some success as a writer, and in consequence he seldom practised. After about a year's connection with *'Fun'* he joined the staff of *'Punch'* in 1863, becoming editor in 1880. He resigned this position 14 Feb. 1906. His book, *'Happy Thoughts'*, republished from *'Punch'*, went through several editions, and was followed by *'More Happy Thoughts'* (1871); *'Happy Thought Hall'* (1872); *'Quito at Home'* (1890). Other successful productions of his

are the extravaganzas, *'New Light on Darkest Africa,'* and *'Ride to Khiva'* (making fun out of H. M. Stanley and Col. Burnaby respectively), the parody on Ouida's novel, *'Strathmore,'* which he published under the title of *'Strapmore,'* and *'The Modern Sandford and Merton.'* Numerous plays have come from his pen, mostly of the nature of burlesques and light comedies, such as the plays *'Black-eyed Susan'* (a burlesque of Douglas Jerrold's drama), and *'The Colonel.'* In 1879 he issued a history of the Amateur Dramatic Club, which he had founded at Cambridge University. He collaborated with Sir A. Sullivan in the light operas *'The Chieftain,'* produced in 1894, and *'Contrabandista.'*

Burnap, George Washington, American Unitarian clergyman: b. Merrimack, N. H., 1802; d. 1859. He was graduated at Harvard College in 1824, and in 1827 he was ordained pastor of the First Independent Church in Baltimore, where he remained until his death. He was a voluminous writer, his publications being chiefly of a theological and controversial character. They include a doctrinal work on the *'Controversy Between Unitarians and Other Denominations of Christians'* (1835); *'Lectures to Young Men'*; *'Lectures on the Sphere and Duties of Woman'*; *'Lectures on the History of Christianity'*; *'Expository Lectures on the Principal Texts of the Bible Which Relate to the Doctrine of the Trinity'*; and various other works of theology, as well as numerous occasional addresses.

Burne-Jones, Sir Edward, English painter: b. Birmingham, 28 Aug. 1833; d. London, 17 June, 1898. In 1852 he went to Exeter College, Oxford, where he was a fellow student of William Morris, and afterward became acquainted with A. C. Swinburne (who dedicated his *'Poems and Ballads'* to him). His first intention was to enter the Church of England, and it was not till he had reached his 22d year that he seriously devoted himself to art studies; but, going to London in 1855, he came under the influence of D. G. Rossetti and the Pre-Raphaelite movement, and soon attained considerable success in various departments of artistic work. In 1859 he set out on a journey through Italy in order to see the productions of the early Italian painters and sculptors, and on his return to England he gave in his stained-glass designs and his pictures splendid promise of his subsequent triumphs. In 1865 he began a series of illustrations to Morris' *'Earthly Paradise,'* and he also executed some 70 designs for the *'Story of Cupid and Psyche,'* besides pictures dealing with the same subject. He was elected a member of the Old Society of Painters in Water Colors in 1864, but withdrew from it in 1870, and from this year till 1877 scarcely ever exhibited in London. In the Grosvenor Gallery exhibition of the latter year, however, his works formed the chief attraction. He received the Cross of the Legion of Honor in 1880, was elected in 1885 Associate of the Royal Academy, a position which he resigned in 1893 (having only exhibited one picture at the Academy, *'The Depths of the Sea'*), and he was created a baronet in 1894. His most important pictures are *'Day, Night'*; *'Spring, Summer, Autumn, Winter'* (1867-8); *'The Wine of Circe'* (1869); *'Chant d'Amour'* (1873); *'Be-*



BURNE-JONES.
The Prioress's Tale.

guiling of Merlin' (1877), an illustration of Tennyson's 'Merlin and Vivien'; 'Six Days of Creation' (1877); 'The Golden Stairs' (1880); 'The Wheel of Fortune' (1883); 'Wood Nymph'; 'King Cophetua' (1884); 'Læus Veneris'; 'The Depths of the Sea' (1886); and 'The Briar Rose' series (1890). He holds a specially high place as a designer for stained-glass windows, and in many other departments of decorative art. His leading characteristics as a painter are his fertile imagination and fine poetic feeling, qualities which no painter of the century has possessed in anything like the same degree. The Old-World dreaminess of his work is finely aided by his wonderful power as a colorist. In common with his friends, Morris and Rossetti, he exercised a most potent influence on Victorian art. See Bell, 'Edward Burne-Jones' (1902).

Burnes, Sir Alexander, Scottish soldier and traveler: b. Montrose, 1805; d. Cabul, 2 Nov. 1841. Having obtained a cadetship, he joined the Bombay native infantry in 1821. Here his proficiency in Hindustani and Persian procured him two regimental appointments as interpreter, and contributed greatly to his future promotion. In 1830 he was appointed to proceed to Lahore, ostensibly for the purpose of delivering a present of horses from the king of England to Runjeet Singh, but really for the purpose of acquainting himself with the lower Indus, with the view of opening it up to commercial enterprise. On returning from this mission, which he successfully accomplished, he proposed a mission into central Asia, and having obtained the sanction of the government, set out in January 1832, descended the Sutlej to Lahore, and proceeded thereafter to Peshawur, Cabul, and Bokhara. He afterward traveled with a caravan across the desert of Merv, visited the shah of Persia in his capital of Teheran, traveled southward to the Persian Gulf, and reached Bombay after a year's absence. He published an account of this journey in 1834, under the title of 'Travels into Bokhara.' He was afterward sent to England as the bearer of his own despatches, received the special thanks of the court of directors, and was presented with the gold medal of the Royal and the silver medal of the French Geographical Society. He returned to India in 1835, and in the following year was sent on a commercial mission to Cabul. While there he discovered that Russia was intriguing to detach the emir, Dost Mohammed, from the British alliance, and on finding the emir disposed to be friendly to Great Britain, he urged Lord Auckland to come to terms with him. His advice was, however, rejected, and a force was dispatched in 1839 to reinstate Shah Sujah on the throne. Burnes accompanied the force as second political officer, and received the honor of knighthood. On the breaking out of an insurrection in Cabul, he was murdered with his brother and several other Europeans.

Burnet, Gilbert, British prelate and historian: b. Edinburgh, 18 Sept. 1643; d. London, 15 March 1715. Having graduated at Marischal College, Aberdeen, he zealously devoted himself to the study of law and divinity. In 1661 he qualified as a probationer in the Church, and traveled into Holland in 1664. On his return he was made Fellow of the Royal Society in London, and ordained to the living of Sal-

toun, Haddingtonshire, in 1665. In 1669 he was made a professor of divinity at Glasgow, where he published his 'Modest and Free Conference Between a Conformist and a Nonconformist,' and wrote his 'Memoirs of the Dukes of Hamilton' (1676); and was offered a Scottish bishopric, which he refused. His 'Vindication of the Authority, Constitution, and Laws of the Church and State of Scotland,' in which he maintains the cause of Episcopacy, was much approved of at court, and several bishoprics were successively offered him and refused. In 1673 he was made chaplain in ordinary to the king, and was in high credit both with Charles and the Duke of York. Removing to London he received the appointment of chaplain to the Rolls Chapel in 1675, and shortly afterward the lectureship at St. Clement's. The nation being alarmed on account of the progress of Catholicism, Burnet undertook a 'History of the Reformation in England.' He gave a first volume to the public in 1679, when the affair of the popish plot was in agitation. It procured for the author the unprecedented honor of thanks from both houses of Parliament. The second appeared in 1681; the third, which was supplementary, in 1714. The high character of Burnet as a divine caused him to be sent for by the witty and profligate Earl of Rochester, when, exhausted by a course of libertinism, he was sinking into the grave. The result of his conferences with the dying nobleman he gave to the world in his celebrated 'Account of the Life and Death of the Earl of Rochester.' About this time he wrote a letter to the king censuring his public misgovernment and private vices. His connection with the opposition party was now very intimate, and he attended Lord William Russell to the scaffold, when executed for his share in the Rye House plot. He published during this period several works in favor of liberty and Protestantism, and wrote the lives of Bishop Bedell and Sir Matthew Hale (1682); and in 1683 made his translation of More's 'Utopia.' On the accession of James he made a tour in France and Italy, and in 1687 he published an account of his travels in a series of letters to Robert Boyle. When at Utrecht he was invited to The Hague by the Prince and Princess of Orange, and had a great share in the councils relative to Britain. James caused a prosecution for high treason to be commenced against him in Scotland, and demanded his person from the states, who refused to deliver him up. In the revolution he took an active part, accompanying the Prince of Orange to England as chaplain, and was rewarded for his services by the bishopric of Salisbury. On taking his seat in the House of Lords, he displayed his usual moderation in regard to the non-juring clergy and dissenters. As a prelate, Bishop Burnet distinguished himself by fervor, assiduity, tolerance, and charity. In 1699 he published his 'Exposition of the Thirty-nine Articles.' The scheme for the augmentation of poor livings out of the first-fruits and tenths due to the Crown, known as Queen Anne's Bounty, originated with Burnet. He left behind him in manuscript his well-known 'History of His Own Times' (1723-34), upon which the best judgment to-day is that nothing could be more admirable than his general candor, his accuracy as to facts, the fullness of his information, and the

BURNET — BURNETT

justice of his judgments both of those whom he vehemently opposed and of those whom he greatly admired. The value of the work, says a recent authority, "as a candid narrative and an invaluable work of reference, has continually risen as investigations into original materials have proceeded."

Burnet, Jacob, American jurist: b. Newark, N. J., 22 Feb. 1770; d. Cincinnati, Ohio, 10 May 1853. Admitted to the bar in 1796, he removed to Cincinnati, then a village with about 500 inhabitants, and was a member of the territorial government from 1799 till the establishment of a State government in 1803. In 1821 he was appointed judge of the supreme court of Ohio, and was elected United States senator in 1828. Burnet was elected a member of the French Academy of Sciences upon the recommendation of Lafayette, and published in 1847 a volume of 'Notes on the Northwestern Territory.' He was prominent in civic enterprises in Cincinnati for over half a century, assisting to establish the Lancasterian Academy; helping to found the Cincinnati College, whose first president he was; besides being president of the Ohio Medical College, and the Cincinnati Colonization Society.

Burnet, John, Scottish engraver, painter and art-critic: b. Fisher-row, near Edinburgh, 20 March 1784; d. 1868. He learned etching and engraving, and with Sir William Allan and Sir David Wilkie, was a student in drawing and painting at the Trustees' Academy, Edinburgh. In 1806 he went to London, where he engraved Wilkie's 'Jew's Harp'; 'Blind Fiddler'; 'Rent Day'; 'Rabbit on the Wall'; 'Chelsea Pensioners Reading the Gazette of the Battle of Waterloo' (his largest and most elaborate work); 'Letter of Introduction'; 'Death of Tipoo Saib'; and 'Village School.' He also engraved plates from several recent painters, from the Rembrandts in the National Gallery, and from several of his own paintings. He published 'Practical Treatise on Painting' (1827); 'Rembrandt and His Works' (1849); 'Life and Works of J. W. M. Turner,' with Cunningham (1852).

Burnet, Thomas, English divine and philosopher: b. Croft, Yorkshire, about 1635; d. London, 27 Sept. 1715. He was educated under Dr. Ralph Cudworth at Cambridge, and afterward traveled as tutor to several young noblemen. In 1681 he made himself known by his 'Telluris Theoria Sacra,' which he subsequently translated into English. In 1685 he became master of the Charter-house, and after the revolution of 1688 was appointed chaplain in ordinary and clerk of the closet to King William. In 1692 he published 'Archæologia Philosophica, sive Doctrina antiqua de Rerum Originibus,' but the freedom of opinion displayed in this work led to the removal of the author from the clerkship of the royal closet. Two posthumous works of this author appeared in 1727—the treatises 'De Fide et Officiis Christianorum'; 'De Statu Mortuorum et Resurgentium.' All the works of Burnet exhibit him as an ingenious speculator, rather than as a patient and sober inquirer concerning the moral and natural phenomena of which he treats. His great work, the 'Theory of the Earth,' is one of the many systems of cosmogony in which Christian philosophers have attempted to reconcile the Mo-

saic account of the creation, paradise, and the deluge, with the traditions of the ancients and the principles of modern science. His speculations are recommended by sublimity of description and eloquence of style. In his 'Archæologia Philosophica' he has combated the literal interpretation of the history of the fall of man; and to expose its improbability he has introduced an imaginary dialogue between Eve and the serpent, which, as coming from the pen of a divine, is singular enough. It is only to be found in the first edition of the work.

Burnet, William, American colonial governor: b. The Hague, Holland, 1688; d. 1729. He was a son of Gilbert Burnet (q.v.) and was appointed governor of New York and New Jersey in 1720. Two years later he founded at Oswego the earliest English trading post on the Great Lakes as the first step in his able Indian policy in New York which accomplished very much for the interests of the mother country and the colonies. In 1728 he was transferred to the governorship of Massachusetts and New Hampshire and was speedily involved in disputes with the Assembly of the former colony over the question of salary.

Burnet, the popular name of two genera of plants, both of which belong to the natural order *Rosaceæ*. (1) Garden Burnet (*Poterium sanguisorba*), a perennial plant which grows to the height of about two feet; leaves smooth, alternate, imparipinnate, composed of serrate leaflets; flowers arranged in rounded heads of a purplish color, with the female flowers above and the male flowers below. It is found wild in sunny places among rocks and in open fields, from New York to Maryland. It is cultivated in kitchen gardens for its aromatic leaves, which are used to season salads. It is also an excellent food for cattle. (2) Canadian Burnet (*P. canadense*) is also a perennial plant; calyx in four divisions; stamens, four. Its stem is straight, from three to six feet in height; leaflets ovate, smooth. This plant grows chiefly in bogs and wet places from Newfoundland to Georgia, and west to Michigan.

Burnet Moth, the name for the genus of hawkmoths, called *Anthrocera*, or, by some *Zygana*. *Anthrocera filipendula* is the six-spot burnet moth. The six spots, which are on the superior wings, are red, while the rest of the wings are green. Its caterpillar, which feeds on the plantain, trefoil, dandelion, etc., is yellow, spotted with black. *A. loti* is the five-spot burnet moth. It is less common. The caterpillar feeds on honeysuckle, bird's foot, trefoil, etc.

Burnett, Frances Eliza Hodgson, Anglo-American novelist: b. Manchester, England, 24 Nov. 1849. In 1865 she went to Tennessee with her parents, and there married in 1873 Dr. S. M. Burnett. Divorced from him in 1898 she married in 1900 Stephen Townsend, an English writer. Her first conspicuous literary success was 'That Lass o' Lowrie's,' a story of collier life in her native county, which appeared originally in 'Scribner's Magazine,' and in book form in 1877. Her other works, which usually appeared first in serial form, include 'Theo, a Love Story' (1877); 'Kathleen Mavourneen' (1879); 'Haworth's, a Novel' (1879); 'Louisiana' (1880); 'A Fair Barbarian' (1881); 'E-

BURNETT—BURNEY

meralda, a play (1881); 'Through One Administration' (1883); 'Little Lord Fauntleroy,' a story of child-life, which has had very great success both as novel and as drama (1886); 'Sara Crewe' (1888); 'Little Saint Elizabeth' (1889); 'Two Little Pilgrims' Progress' (1895); 'A Lady of Quality' (1896); 'His Grace of Ormonde' (1897); 'The Captain's Youngest' (1898); 'In Connection with the De Willoughby Claim' (1899); 'The Making of a Marchioness' (1901); 'The Little Unfair Princess' (1903). Mrs. Burnett's work shows great versatility in the creation of character, and has but little of the sensational element.

Burnett, James (LORD MONBODDO), Scottish judge: b. at the family seat of Monboddoo, in Kincardineshire, 1714; d. Edinburgh, 26 May 1799. After studying at Aberdeen and Edinburgh he went to the University of Groningen, whence he returned in 1737, and commenced practice as an advocate at the Scottish bar. In 1767 he was raised to the bench on the decease of his relative, Lord Milton. He distinguished himself by his writings as a metaphysician, having published a work on the 'Origin and Progress of Language' (1773-92), and 'Ancient Metaphysics' (1779-99, six volumes). Lord Monboddoo was an enthusiastic admirer of ancient literature, and especially of the works of Plato and other Grecian philosophers. His works contain many interesting observations, but also exhibit some strange and paradoxical opinions. Thus he seriously advocates the existence of satyrs and mermaids, and has advanced some whimsical speculations relative to the affinity between the human race and the monkey tribe, which exposed him to a good deal of ridicule on the first publication of his theories. Both his official and his private character were extremely respectable; and he was, notwithstanding some eccentricities, a man of learning and ability.

Burnett, Peter Hardeman, American pioneer and writer: b. Tennessee, 1807; d. 1895. In early life he removed to Missouri and thence to Oregon, where he assisted in establishing a territorial government and sat for two terms in the legislature. He was one of the first of the gold hunters in California in 1848, and actively advocated organization of civil government without delaying for action of Congress. When the new constitution was adopted he was elected governor, resigning in 1851. He was judge of the supreme court, 1857-8, and president of the Pacific Bank of San Francisco, 1863-80. He published 'The Path Which Led a Protestant Lawyer to the Catholic Church' (1860); 'The American Theory of Government Considered with Reference to the Present Crisis' (1861); 'Recollections of an Old Pioneer' (1878); 'Reasons Why We Should Believe in God, Love God, and Obey God' (1884).

Burnett Prizes, two prizes established by John Burnett, merchant of Aberdeen, on his death in 1784. He left a fund from which were

to be given every 40 years two theological prizes (not less than \$6,000 and \$2,000) for the best two essays in favor of the evidence that there is an all-powerful, wise, and good Being, and this independent of all revelation. The first competition was in 1815, when Dr. Brown, principal of Aberdeen University, gained the first prize, and Dr. John Bird Sumner, afterward archbishop of Canterbury, the second. In 1855 the first prize was adjudged to the Rev. R. A. Thompson, Lincolnshire, and the second prize to the Rev. Dr. John Tulloch, afterward principal of St. Mary's College, St. Andrews. The destination of the fund was applied by Parliament in 1883 to the establishment of a lectureship on natural theology in the University of Aberdeen.

Burney, Charles, English composer and writer on music: b. Shrewsbury, 12 April 1726; d. Chelsea, London, 12 April 1814. He studied music under the organist of Chester Cathedral there, and at Shrewsbury, under the direction of his half-brother, an organist, and afterward in London between 1744 and 1747, under Dr. Arne. In 1751 he obtained the place of organist at Saint Margaret's Church, Lynn Regis, in Norfolk. Here he commenced his 'General History of Music.' In 1760 he returned to London, where his compositions and the musical skill of his eldest daughter, then eight years of age, excited admiration. In 1769 he took the degree of doctor of music at Oxford. In 1770 he visited France and Italy, and two years afterward, the Netherlands and Germany, for the sake of his great work. He published accounts of both tours. After his second return he became a Fellow of the Royal Society. In 1776 appeared the first volume of his 'General History of Music from the Earliest Ages to the Present Period' (4to), the second in 1782, and the third and fourth in 1789. He was the author of several other valuable works, among which are the 'Memoir of Handel,' and a 'Life of Metastasio.' He died in the office of organist at Chelsea Hospital, and in receipt of a pension of \$1,500. He wrote most of the musical articles in Rees' Cyclopaedia. His second daughter, Frances or Fanny (Madame D'Arblay, q.v.), well known as an authoress, published a memoir of her father.

Burney, Charles, English classical scholar and critic, son of Charles Burney (1726-1814, q.v.): b. Lynn, Norfolk, 4 Dec. 1757; d. 28 Dec. 1817. He received his education at the Charter-house School, at Caius College, Cambridge, and King's College, Aberdeen, where he took the degree of M.A. He carried on a private school, distinguished himself as a writer in the 'Monthly Review' and the 'London Magazine,' to which he contributed many articles on classical literature; subsequently entered into holy orders, and obtained some preferment in the Church. His valuable collection of books, many of them enriched with manuscript notes, was purchased by Parliament for the British Museum.

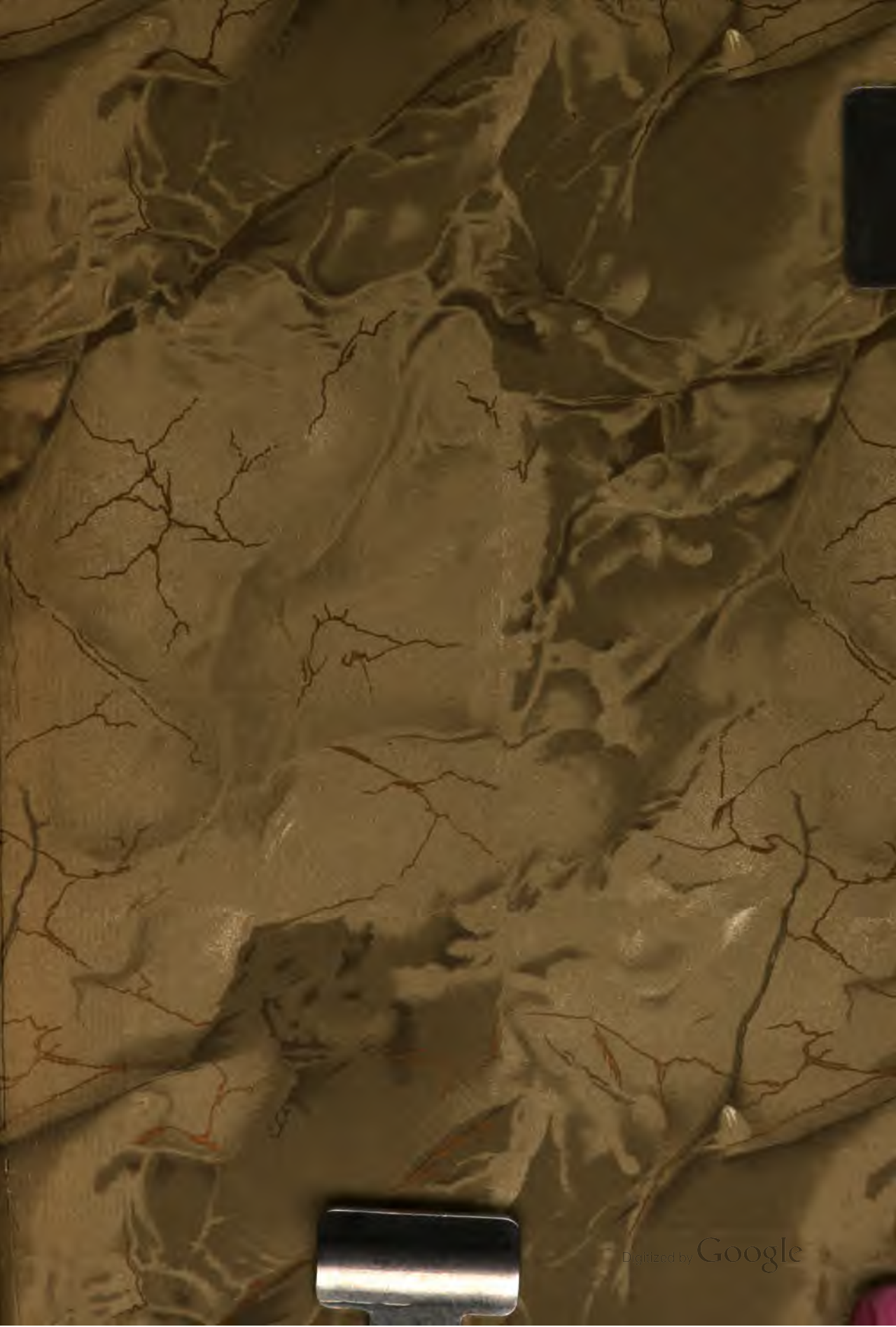
Burney, Frances. See D'Arblay, Madame.

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